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## The Sir Richard Stawell Oration.<sup>1</sup>

### FUNDAMENTAL PRINCIPLES IN MEDICAL PRACTICE.

By A. E. COATES, O.B.E., M.D., M.S., F.R.A.C.S.,  
Melbourne.

I AM deeply sensitive of the honour you do to the medical men who have served in the Far East in selecting one of them to deliver this, the thirteenth, oration in memory of the late Sir Richard Stawell.

I am following the lead of distinguished predecessors on this platform in recording the lasting influence of that great man as a teacher and personal exemplar in the practice of medicine. It was my good fortune to be one of his pupils.

At the Royal Melbourne Hospital in the early nineteen twenties Sir Richard was at the zenith of his career. His clinic was large; nevertheless he contrived to remember the names of his students and appreciate their difficulties. When the regular teaching of the group was concluded he would take the student aside and answer any questions relating to the problem in hand. Not content with giving merely a routine discourse, he would call for the student's case book and have the history and physical signs read before the whole clinic. I shall never forget my first experience of reading a somewhat lengthy account of a patient's complaints and the evidences of disease as presented to my indiscriminating eye. The caustic comments of the master amused my colleagues and brought me down to earth. He then kindly proceeded to enlighten us all on

the important subject of listening to the patient's story, intelligently questioning him, discarding the irrelevant, sifting the evidence as it were, and then by a careful examination using all the senses to arrive at a diagnosis. If help could be obtained from a radiological, biochemical or other examination, such appropriate investigation would be ordered. A provisional diagnosis based on the patient's history and physical signs as presented at the bedside was expected in all cases. So keen was our teacher to help us that even during a Christmas vacation, when he was on leave from the hospital, he would call to see a sick patient in whom he was particularly interested, and for an hour or more would delight his listeners with a clinical demonstration. Then he would take us to the pathology museum and illustrate his remarks by referring to the appropriate specimen. He insisted that the student should learn to listen carefully to the first-hand account of symptoms as related by the sick man, that no slipshod examination of the patient's body should be carried out, that the sick man was the first problem and the morbid process a part of that problem. His interest in neurology and psychiatry gave him great insight into the many facets of the disordered human. The orderly arrangement of the signs of disease, the mode of onset and the procession of symptoms against the background of the patient's diathesis—these were the principles he constantly stressed. They were indelibly imprinted on our minds.

Critics might suggest that in those years not enough emphasis was laid on the value of special investigations by the physicians of the older generation, that too much reliance was placed on symptoms and signs when more scientific methods for accurate diagnosis were being made available. I would assure them that Sir Richard frequently called for diagnostic help from the radiologist and the biochemist. To misquote Pope: "He was not the last by whom the new was tried nor yet the first to lay the old aside." He would take us down to the X-ray department and in the dark room have the radiologist give us a visual

<sup>1</sup> Read at a meeting of the Victorian Branch of the British Medical Association on October 2, 1946.

demonstration of a gastric ulcer. Those of us who studied for the M.D. in the middle 1920's were almost alarmed to find that he, as an examiner, knew the latest work on encephalography and ventriculography for the X-ray diagnosis of brain tumours. His frequent presence in the operating theatre, observing the surgeon's findings, checking his own diagnosis and offering ready suggestions for the patient's comfort, reminded us that here was a teacher who was interested in living pathology and not a mere dispenser of medical platitudes. Shall one ever forget a bedside lecture on prognosis and the duties of the doctor to a dying patient and his relatives? A fellow student was asked by Sir Richard why brandy was given to a patient who was very ill with pneumonia. The reply, "To produce a sense of well-being", Sir Richard corrected "To produce a lessened sense of ill-being". When a zealous, well-meaning medical officer requested that he should perform various technical procedures on a dying man, our teacher quietly advised him to leave the poor fellow alone and let him die in peace. Then a solemn injunction to us to remember that our task was not completed when we had made a diagnosis and perhaps ordered treatment; we had a duty to the patient and his relatives in informing them of the prospects, that is, to give a prognosis; that we were called upon at times to assume certain legal functions and when the end drew near, maybe to act as pastor or priest. He taught us to reverence the person of the patient. His classical training and his knowledge of Holy Scripture were sometimes invoked to illustrate or illuminate a facet of the case. Quoting one day the phrase "bowels of compassion", he gave us an exposition of the interrelationship between the mental and the physical and adumbrated some future discoveries on the autonomic nervous system. He was a philosopher who practised and taught the art of medicine, nor did he disdain, but keenly welcomed and acclaimed, the science which was yearly extending its boundaries. In 1926, when I was working with Professor Ties (now a world authority on muscle histology) in the university laboratories, he visited us and watched us operating and demonstrating effects of electrical stimulation of nerves. Later he acted as chairman of a committee of the Royal Australasian College of Surgeons, which reviewed and reported on the value of operations on sympathetic nerves in patients suffering from spastic paralysis. His wide reading, his mature experience, his profound knowledge of disease, his critical and informed approach to the problem in hand rendered him a most valued consultant in matters of medical research. His frequent attendance at meetings of the Melbourne Hospital Clinical Society was appreciated by the junior members of the staff. His summing up of a case was judicial. To him the meeting appealed as did so many patients and practitioners for the last word on a difficult medical problem. He exerted a unifying influence and was the acknowledged leader of a band of clinical teachers whose fame and reputation have spread far and wide throughout the Australian continent. His catholic interest in medicine, his up-to-date knowledge of current advances, his appreciation and encouragement of young men engaged in teaching and research inspired generations of physicians and surgeons alike to rise up and call him blessed. He trained us to be doctors.

The praise of famous men has become old fashioned in some quarters. There is a tendency to reduce all to a common level, despite the fact that Nature has ordained that physically, intellectually, morally and spiritually some men are born to lead. Sir Richard was one who, by natural endowment and painstaking efforts over many years, had arrived as the acknowledged doyen of Australian medicine. He was a driving force, a dynamic personality, but also he adorned the profession to which he had dedicated his life. I make no apologies for hero worship, but venture to suggest that such a seasoning of our bland and insipid political, social and professional diet would render it more palatable and produce a sense of collective and individual well-being. With his teaching as a background and his character as an example, some of us were able to apply the principles of medicine, the fundamentals of the healing art, in the primitive jungle camps which served

as so-called hospitals for prisoners of war under the Japanese yoke.

The founder of this oration, Dr. A. Rowden White, has asked me to tell the story of medical organization and practice in prison camps. As this subject has been freely discussed recently in this hall and elsewhere in medical publications, I apologize if in attempting to expound the text of the oration I introduce matter which is familiar to many of you.

The care of the sick and wounded, the function for which we members of the Australian Army Medical Corps had been enlisted, did not cease with the surrender of the garrison at Singapore. Rather was the work rendered more difficult by the restrictions imposed by the Japanese and the denial of appropriate equipment and drugs. This story is confined to a description of medical work performed for the British, Dutch, Australian and American prisoners of war who were employed on the construction of the jungle railway from Moulemein to Bangkok. A similar story could be related by Major Bruce Hunt and Lieutenant-Colonel Dunlop, who accompanied parties on the Siam side.

Throughout 1943 the whole body of prisoners of war was driven as a slave gang under the most primitive conditions. In early 1944 most of the survivors were brought to concentration camps in Siam, a few were retained in the jungle for maintenance of the line, and a few were shipped off to Japan. I shall record some experiences as senior medical officer in a jungle hospital of 1,800 patients in Burma in 1943 and as chief medical officer of the large hospital camp at Nakompatom, Siam, 1944-1945. On leaving Sumatra for Burma in May, 1942, we were informed by the Japanese that at our destination a modern hospital with all necessary equipment would be provided. Hence, of what little local supplies were available, no drugs or medical stores were to be carried. This story was repeated monotonously throughout the whole of our conducted tour in the following years. Those who came from Singapore to Burma or Siam were informed that they were going to convalescent camps in the mountains and consequently many semi-fit men were taken in those parties. In the early days of imprisonment, crowded conditions, faulty sanitation and the coarse diet had produced epidemics of bacillary dysentery, to which many succumbed. In my party from Sumatra amebic dysentery broke out in fulminating form. By the latter part of 1942 bacillary dysentery was fairly well under control in our moving population, but the more chronic form of amebic infection was insidiously spreading. Deficiency disease, due to lack of meat (protein) and certain vitamins, was rife, though in its milder forms, and malaria, for the treatment of which quinine supplies were never adequate, caused a sombre background of chronic ill health. Beriberi, due to lack of vitamin B<sub>1</sub>, was not so common as would have been expected. A few men developed paralysis of the legs, and here and there were deaths from sudden heart failure (beriberi heart). Though polished rice was the staple ration, and an estimate of the total vitamin B<sub>1</sub> content of the diet showed a woeful lack of that substance, nevertheless the incidence of beriberi was slight. Edema or dropsy, a swelling of the abdomen and legs, became common. At first it was thought to be beriberi. Clinical examination revealed no paralysis or other signs, such as the inability to stand up after squatting, absence of reflexes *et cetera*, but often an exaggeration of reflexes and even spasticity, and the opinion of our leading physicians in Burma, Major W. E. Fisher, Australian Army Medical Corps, of Sydney, and Lieutenant-Colonel H. Larsen, Dutch Army Medical Corps, of Batavia, was soon formed that the disease was due to lack of protein. The two officers just mentioned were stationed at a base hospital at Thambyuzayat, to which some of the sick trickled back in early 1943, but which, on account of transport difficulties, soon became an asylum for a static population until allied bombing demolished part of it and rendered it untenable. Further evidence that the dropsy was due to hypoproteinemia was provided by the therapeutic test applied in a few cases. Meat from the general ration, always pitifully small, was given as the sole food

and fluids were withheld. The dropsy disappeared. In some cases improvement occurred, but in others the body withered away.

By July, 1943, a variety of diseases had presented themselves—smallpox in one camp, cholera in others, scrub typhus in most, but the three great scourges were nutritional disorders: chronic dysentery, recurrent malaria and that monstrous offspring, tropical or jungle ulcer. The Japanese supplied vaccine for smallpox and also, in the later stages, inoculations for cholera. At Kohn Kuhn in Burma (55 kilometres) an abandoned working camp, eight bamboo huts provided partial shelter from the elements for the sick. There were no beds, bedding, blankets, sheets, washing utensils or dressings. Sick men lay on bamboo platforms in long rows with no space between them. I arrived on a stretcher suffering from scrub typhus on July 12. The camp was filling up with the derelicts, Dutch, Australians and British. Captain John Higgins and Captain Reeling Knapp carried on alone for three weeks until I was able to walk. By that time 1,800 men had arrived. After vigorous appeals to the Japanese headquarters through Brigadier Varley and Lieutenant-Colonel T. Hamilton, the medical staff was increased by two. Medical orderlies were few, as the Japanese compelled the Army Medical Corps personnel to work on the railway line. A dozen or so orderlies were made available, but it was quite impossible for them to handle the large number of sick. So volunteer medical orderlies were called upon to assist. Convalescent sick were recruited and given instructions in the elements of nursing. Officers recovering from illness were called upon to do the washing and cleaning work. Other officers made beds, of bamboo and bags, for men recently operated upon, bamboo artificial legs and utensils of sorts from tin and bamboo. Captain Van Bostel, a Dutch airman prisoner of war, came to my aid in making spirit from waste rice, catgut ligatures, emetine from ipecacuanha. Malaria was almost universal and quinine was supplied for only one-sixth of the camp population, that is, only those admitted with a diagnosis of malaria as the primary disease. Though large stocks of this drug were available to the Japanese, so stupid were their medical regulations that no patient was permitted to have more than one disease. Unfortunately this debilitating infection, malaria, was a background of the other diseases. A malaria survey was carried out by Dr. T. Le Gay Brereton and the more severely ill patients were given the quinine supplies. The disease was recognized without the use of a thermometer, microscope or stains. The typical onset of shivers followed by fever, the enlarged spleen, then remission with sweats and the recurrent attacks made the diagnosis easy. The therapeutic test with quinine solved the problem in a doubtful case. Morbid examination revealed that diagnosis was not so frequently wrong as would be expected. Examination of the urine by the usual methods of the consulting room was carried out with camp-made apparatus and bottles, and reagents made in the camp.

Jungle ulcers were common. There were five hundred at that time, half of which were large painful sores involving muscles and bones of the leg. We had never seen the like before, nor had our Dutch colleagues. The textbooks of tropical medicine described something of the sort occurring in slave gangs, suffering from malnutrition, labouring in malarious jungle, but the destructive processes which we observed were not discussed in detail even in Manson-Bahr's textbook of tropical medicine. Using our basic knowledge of pathology, we watched the morbid process and from these observations devised treatment. For example, dead tissue was removed, were it a slough on the surface (hence the curettage of ulcers), a dead tendon, or a dead leg. When tissue showed a little reaction, that is, inflammation, the latter process was encouraged by the application of rice poultices. Bits of clothing, given by patients, were used for the purpose and the rice which the patient could not eat was used as an external application. It retained heat well. A small quantity of iodoform was obtained for a few patients and its local application usually worked wonders. Later in the period at that camp the Japanese supplied a stirrup

pump and spray for the irrigation of the ulcers. The cause of these ulcers was an infecting organism which we could not identify, but the soil in which the organism was sown was the debilitated patient. Healing of the ulcer could be aided by external antiseptics, but for the most part it occurred from within.

During a stay at a previous camp I had obtained a small bottle of cocaine tablets used for dental purposes. Also a Japanese medical officer had ironically allowed me to pick up a few gynaecological instruments, as a reward for extricating him from a surgical mess. When it became clear that gangrene of the leg was causing death, I decided that amputations had to be undertaken, despite the utter lack of proper operating facilities. After all, amputation was a primitive surgical procedure performed by Ambroise Paré three hundred years ago on the battlefield. It was an operation practised by the Romans in ancient times. We could improve a little on Paré by giving a spinal anaesthetic of cocaine; 1.5 millilitres became the standard quantity for all leg amputations, of which 120 were done in that camp.

The details of the surgical work have been described elsewhere. Suffice it to say that the conditions were similar to those of the pre-Listerian period, when laudable pus was welcomed by the surgeon as the herald of healing. We were aware of vitamin lack, but the best we could do was to encourage men to eat all they could get, hoping that either there would be some catalytic effect of small quantities of vitamins in the food or that men would make their own in some mysterious manner in their bodies. I urged the men to eat the rice in oriental fashion, that is, flavoured with chillies, which the Japanese supplied, not because I knew there was more than a small amount of vitamin B<sub>1</sub> in a chilli, but on the assumption that as millions of orientals live on such a seasoned rice diet there must be something good in it. The anorexia, so marked in many who died, could be explained as pellagra. Ulceration of the tongue, pharynx and oesophagus with associated cardiospasm prevented these men from ingesting the miserable food supplied. The gastro-intestinal mucosa withered early and the vicious circle so created needs no elaboration.

As the months passed and some of the patients recovered, they began to explore the environs of the camp at night, and it was not long before a regular trade in village cattle was developed. But for the timely arrival of this secret supply of meat many more men would have died. The adventurous boys had the satisfaction of seeing many of their comrades recover as the result of their nocturnal negotiations. We buried over 330 men there.

In a report to the Japanese, in early 1944, on that camp I wrote:

It was the usual working camp serving as a depot for sick. I shall describe it in detail as the conditions in this camp presented a picture of the results of exhaustion and forced labour in an army of workers which might well have been conserved as a valuable labour force, leaving out of consideration any humanitarian motives. . . . The spectacle of emaciated skeletons of men on the one hand and edematous waterlogged wrecks on the other, many with rotting gangrenous ulcers of the leg, emitting a nauseating stench, lying in their pain and misery, was such as I never wish to witness again. The daily procession to the graveyards of numbers of patients was a reminder to those still alive that the consolation of death would soon ease their sufferings. Never did I see anything so appalling in two wars as the condition in that camp. The memory of it is not easily obliterated.

The best that could be said of the Japanese attitude to the sick was that they did not interfere with the doctor-patient relationship, though they failed to act on the doctor's advice and they denied us the facilities we had the right to expect. When it was suggested to me at one stage by the Japanese colonel in charge of Burma prisoners of war that the "amputees" should go to a Japanese hospital in Moulemein, a polite gesture only, the patients in question pleaded with us to stay with their own doctors in our jungle camp. I received from the Japanese sergeant-camp commander much violent abuse and threats of some-



thing worse for daring to discuss such a matter with the Japanese colonel. Nothing came of the suggestion.

Early in 1944 the British, Dutch and Australian survivors of the railway holocaust were taken to Siam, where, at Nakomptom, near Bangkok, a camp for 10,000 sick had been built. There was nothing unusual about the structure of buildings nor of the usual Japanese drug supply, but fortunately consignments of American Red Cross drugs and dressings were released by the Japanese in May and July, and with this material, small as it was for the large numbers of patients, we were able to make progress along more scientific lines. The general organization of this camp has been described in my paper of June 1, 1946.

As the chief medical officer of this primitive hospital, I sought first of all to organize personnel and allot duties to doctors as their training and interests dictated. The Japanese allowed three doctors and ten medical orderlies per thousand patients. This was not enough to cope with general medical work, to say nothing of the specialist services which it was so desirable to develop. Fortunately, as batches of sick prisoners of war came in, there was often a sick medical officer, and as he recovered he was put to work, so that eventually we had a medical staff of thirty-five active doctors for seven thousand patients. High ranking medical officers were given administrative positions, for example, as senior medical officers of blocks. Thus the regular Royal Army Medical Corps officer performed a useful function, but the combination of administrative and technical ability was necessary for much of the work, and I am pleased to record that Major Vardy, Royal Army Medical Corps, Major Fisher, Lieutenant-Colonel Dunlop and myself found useful activities in both fields.

The basic training of a doctor is in general medicine, and those officers who had been well grounded in that art proved to be the most useful. If, in addition, some special aptitude in a craft such as surgery or a science such as pathology was possessed by the officer, he could be appropriately placed. But if he was weak in fundamental medicine he required direction. On the other hand, much of the success of the hospital in later months was due to the specialists, Major Marsden, Royal Army Medical Corps (pathology), Captain Marcowicz, a physiologist who organized blood transfusions, scientists Kostermans and Chapman, who designed apparatus and manufactured all kinds of biological products.

It was necessary to weave into the general pattern the ideas and personal skill of various specialists and not to permit a lopsided development of the hospital. While the intellectual brilliance and manual dexterity of some should be exploited, it was important that the unbridled activities of others should be checked, especially those who, with the best intentions, were qualifying as doctors who knew more and more about less and less.

The three senior physicians advised on such matters, forming an international medical and dietetic advisory committee. Final decisions were made by three senior officers, Larsen (Dutch), Malcolm (British) and myself.

The work of Major Hazelton, who improvised optical apparatus and took charge of patients suffering from amblyopia, was of great value. His experiments were encouraged and his results justified financial aid. On the other hand, ill-balanced and premature application of theory without due regard to accurate clinical findings occasionally required tactful handling. In 1944 there were many scores of patients in the camp whose disease was loosely diagnosed as cardiac beriberi. This term was freely used by one of our doctors who was highly trained in laboratory technique, but in clinical methods was less skilled. He expounded an elaborate theory on the cause of the alleged heart weakness in these patients. Papers were read and the subject was freely discussed. I called for a clinical appreciation of these patients by the three senior physicians and also comments by any other doctors who wished to examine them. On the advice of the consultants the great majority of these patients were soon transferred to the convalescent block and in a few weeks they were fit to join the working parties. The term cardiac

beriberi was henceforth to be used only after the consulting physicians had made that diagnosis. The ward doctor or general practitioner was not the final arbiter of his patient's destiny, but he passed on his problem patients to the appropriate consultant or specialist for advice, while retaining an interest in the necessary treatment. He did not simply "pass the buck". The younger men followed the advice of their seniors; free discussion and exchange of views were always encouraged. These doctors doing the routine work, with a few exceptions, did a magnificent job. The relief of human suffering was their main concern. By their devotion to duty and their constant endeavours to alleviate the unhappy lot of their fellows, they were able to restore many to health and present a total mortality for the camp, over twenty months, of 2.8%.

Several months passed before I could adequately assess the relative values of the medical officers on the staff and there were trials and some errors before we eventually worked out a smoothly functioning and efficient team. Fortunately, Lieutenant-Colonel Larsen, deputy chief medical officer, and Major Vardy had specialized in tropical medicine, whereas Major Fisher was an experienced internist or consulting physician. Fisher possessed some of the attributes of Sir Richard Stawell. His broad outlook and classical education provided a background against which his Australian and English training as a physician shone at its best. A philosophical approach to the study of our camp clinical problems was indeed refreshing.

My training in surgery, with its stress on action, incisive and decisive, and my experience as a ranker in the first World War tended to produce a well-defined attitude on many important matters. For this reason I had recourse to the committee of physicians, Larsen with his European breadth of vision, Vardy with his steadiness, honesty and characteristic British phlegm, and Fisher with his critical analysis. With such counsellors I was able to make important decisions in the full knowledge that I had advice from excellent medical representatives of three continents. These three officers collaborated fully and worked out a diet scale and the allotment of the camp rations together with any extras procurable from local canteens. It was essential to have some such control. Money obtained from levies on officers' pay, secret sources from outside, and profits from the canteen and funds sent in clandestinely from other camps was never sufficient to meet the cost of the diet ordered by the attending doctor. Drugs from the American Red Cross were a godsend; but for 1,346 amebic dysentery patients there was enough emetine to give only 250 a five-grain course. Hence the more seriously ill patients were treated with the precious drug, the others being left to cure or arrest the disease by rest, diet and astringents. We obtained a quantity of native herbs, *Tinospora cordifolia*, which the Japanese insisted was as good as emetine. It was of as much value as cold tea. Some of the poor fellows had developed such a severe infection in the large bowel that they failed to respond to drugs. For this reason surgery was invoked. The operation of ileostomy was introduced as a means of providing rest for the ulcerated colon. Rest, general and local, is a fundamental principle in the treatment of disease. Diverting the intestinal traffic through an artificial opening in the abdominal wall had an immediate effect in providing rest and quiet to the harassed patient, at the same time permitting healing to occur. As far as we knew there was no precedent for it in amebic dysentery. The first experiment was tried on a Dutchman at Tavoy in 1943. He recovered so well that he worked as a medical orderly, wearing a Dutch water bottle as a receptacle for two years before I finally closed the orifice and reestablished the normal canal. Autopsy study informed us that the operation could be safely done, as the amebæ never infected the small intestine. The results in 23 cases were gratifying. Towards the end of our imprisonment my medical colleagues, Larsen and Fisher, were calling more frequently for surgical help in these cases. Fortunately the end came in time to permit of intensive amebicidal treatment to be effective in the great majority. As the



chief medical officer was a surgeon, it might be thought that emphasis was placed by him on surgical methods. The following extract from the Nakomptom prisoner-of-war hospital war diary illustrates the official attitude of the prisoner-of-war medical control: "At a conference of medical officers in July, 1944, the subject discussed was surgery in chronic disease of the large bowel. Lt.-Col. Coates summed up as follows:

As long as drugs were available, surgical procedures were to be pushed further and further back. Under jungle conditions, surgery had undoubtedly had its place and may possibly not have been resorted to as often as it should have been, but under present conditions drugs must be given a full trial before operative measures were considered, and only after the senior physician had been called in consultation. As regards the choice of operation, he considered that ileostomy should be done."

Amoebic abscess of the liver was diagnosed by clinical signs and the aspirating needle on the operating table. No case came to autopsy undiagnosed. If yellow or creamy pus was obtained, surgical drainage of the abscess was done at once.

The control of malaria, almost universal among 7,000 sick, was a problem. They had little clothing and few had blankets. Mosquito nets were few; they were large Japanese nets covering twenty or more men. Oiling of stagnant water, of which there was always a large surface in the camp (an old rice field), was undertaken. Quinine supplies frequently broke down and then the graphs for malaria would show a sudden rise. Chronic anaemia could not be treated by drugs, as no iron was supplied. Blood transfusion was done as a routine. There being no citrate, the usual anticoagulant, defibrinated blood, was given. This was first introduced by Major Reid, Royal Army Medical Corps, and organized at Chungki Camp, by Captain Marcowicz. It was early practised at Nakomptom. A team of lay officers and non-commissioned officers, trained by Marcowicz, carried out the technical work. Details of the method are described elsewhere. Suffice it to say that the donors' blood was received into a sterilized cut-down bottle and stirred for ten minutes with a bamboo switch, to which clot became adherent, and then this blood was administered to the recipient through a needle. Blood typing was carried out by the naked eye. We knew nothing of Rh factors; reactions were surprisingly few and no fatalities occurred.

Major Marsden, Royal Army Medical Corps, conducted routine pathological and biochemical investigations, for example, gastric analysis. A test meal was given consisting of rice pap. Acid would be obtained from the empty stomach of a man suffering from hyperacidity and this acid would then be carefully bottled and used in medicines made up in our dispensary or supplied neat to men suffering from too little acid and the residue given to the tinsmith for soldering. Thus patients not only helped each other by giving their blood, but by contributing other valuable bodily secretions.

Writing to the Japanese an official report in 1944 I stated, *inter alia*:

This camp hardly deserves the title of hospital, seeing it is a P.O.W. prison and the restrictions of such institutions are obvious. Facilities which might have been expected in a real hospital such as beds and bedding, towels, linen and washing utensils are conspicuous by their absence. The spectacle of a badly wounded or sick man lying on the bare boards of the hut surrounded by dirt and squalor is as discouraging to the doctor as it is appalling to the patient. The medical centre is a good building bearing in mind the limited technical resources available. Instruments are few, many have been made in the camp from old iron and tin. A complete set of modern medical and surgical instruments including an X-ray machine would go far to furnish the clinic in the manner it deserves. . . . There are 500 cases requiring special investigation. Medicine knows no national boundaries, and a discovery which may yield local results and aid cure may have far-reaching effects. The average haemoglobin value for the camp is 75%. Blood transfusions are our most important form of iron therapy, but there is a

gradual leakage of this element and levelling down of the haemoglobin content of the blood of the inmates. . . . As last impressions are generally lasting impressions, I respectfully suggest that the Imperial J.A. implement my recommendations.

Among the recommendations were the transfer of the seriously sick to their home country, the provision of a Red Cross flag and other markings to protect us against allied bombings, and the supply of Red Cross drugs in sufficient quantity to treat our patients adequately; further, food or alternatively money to enable us to purchase food through a canteen organization so that our diet could be improved to at least subsistence level. I also appealed for medical journals, even in German, and medical books, many of which I knew to be in Japanese hands.

The response of the Japanese was meagre indeed. Red Cross supplies were issued as stated above, but a set of operating instruments for which I was compelled to sign was withheld by the Japanese doctor on the pretext that it had been stolen. Many cases of Red Cross drugs were wilfully destroyed by Japanese guards, and the Japanese staff were observed to be in possession of American Red Cross cigarettes. However, a slight improvement in the diet did materialize and many patients were employed on light work, including fly-catching and rat-catching, and by this means our funds were augmented. I requested the Japanese medical officer to inspect a number of patients on July 3, 1944. The following is a copy of a letter written to him officially that night:

Sir,

In pursuance of your request for a report on today's examination of cases of scrotal dermatitis, the following facts are put forward: Of the 5,764 patients in this hospital at present, 564 (as you have seen) are suffering from scrotal dermatitis. Among these cases there are 50 suffering from sore tongue and sore mouth. These latter signs are early indications of pellagra. The scrotal dermatitis is, in our experience, an early sign of vitamin deficiency and precedes the development of pellagra. It can be confidently predicted that in a few weeks the patients we saw today will have more advanced signs of pellagra, e.g., glossitis, stomatitis and visual deficiency. Experience among P.O.W.s in Burma, Siam and Singapore has definitely shown that the following are certain to prevent the development of pellagra: green peas, 50 grammes per day; eggs, 1 per day; green peas 25 grammes and rice polishings 25 grammes per day. As the signs we have seen today are developing at an alarming rate and already 10% of the patients are affected, it is obvious that the need to make up the vitamin deficiency of all the patients is urgent. I respectfully suggest that one of the three items quoted above be supplied to every patient in this hospital daily.

(Sgd.) A.E.C.

The result was twenty-five grammes of foul and dirty rice polishings, the scrapings of the rice mills.

On August 27, 1944, a Japanese colonel (medical) visited the camp and carried out an inspection. Being notified of this fact some days in advance, I requested that permission should be obtained for me to interview this officer. A curt refusal met my request. On the day of the great procession I was allotted a place at the end of a line of Japanese senior and junior officers, non-commissioned officers and privates. As the party arrived at the operating room I managed to slip away and entered this room by a side door just as the Japanese colonel was asking the local Japanese medical officer some questions. The colonel, somewhat surprised, asked who I was. On being informed by the Japanese doctor, he asked me in perfect English: "Are you recovering the sick?" I replied: "No." He asked: "Why?" I said: "Not enough proteins, fats and vitamins in the diet and too few drugs." It is interesting to note that the diet of the camp improved following this interview. The war diary recorded that on November 9, 1944, there had been a steady improvement of the diet.

Regular meetings of the medical staff were held and the lively discussions on the clinical cases presented were a refreshing feature of the week. In March, 1945, the Japanese prohibited all meetings. An open inquiry was held on every case of death. Post-mortem examinations

were reviewed and diagnostic errors corrected. This practice was prohibited also by the Japanese in March, 1945. I could not help but compliment the medical staff on the accuracy of diagnosis and the standard of medical care, this despite the absence of modern appliances and equipment. Of course in some difficult cases we had to stand by and wait for the disease to present itself as a clinical picture. Under home conditions special investigations would have permitted an earlier diagnosis and more effective treatment. We lived close to our patients, and their lives were inextricably woven with our own; except for the few special aids from the pathologists we had to rely on clinical sense. We freely consulted with each other on difficult medical problems. Fortunately the three senior physicians, Larsen, Fisher and Vardy, had been well trained in the old clinical methods and they, together with the surgeons and general practitioners, drew upon a constantly enlarging experience.

Of the surgical work there is little to be recorded, except that it was done under conditions reminiscent of the 1880's. It may seem presumptuous that a surgeon should speak of the practice of medicine. Surgery is a branch of medicine and only when closely integrated as an aid to diagnosis or as a form of manipulative or operative treatment does it deserve the high esteem which it at present enjoys. Ungloved hands were carefully scrubbed and immersed in camp-made alcohol, which provided the only antiseptic. Instruments were few, but intelligent application of mechanics, the background of sound anatomy and pathology enabled us to perform nearly one thousand major operations with a 2% mortality. My surgical colleagues, Dunlop, Krantz, McConochie and Winkel, lived up to the best traditions of our craft. In surgery as in medicine it was necessary to rely on simple methods of diagnosis. The fracture was examined, not with the X-ray machine, but by the methods tested and tried centuries ago. The eye for line, the string for tape measure, and for treatment adequate reduction and then, retention. Fixation apparatus or extension such as that devised by the late Mr. Hamilton Russell was used. Bamboo was plentiful and it was easy to construct appropriate gear. We also used metal spikes driven through the soft tissues above the heel for traction—a form of Steinmann pin. Among the major operations performed were a few on patients with perforated peptic ulcers (of stomach or duodenum). There were over sixty patients diagnosed as possible sufferers from peptic ulcers in the camp. Most of them had had the disease before the war. They were the siftings of 50,000 prisoners of war. This relatively low proportion of peptic ulcer patients contrasts with that in the other theatres of war. One wonders whether the simple diet or the even simpler routine of life were the most important factors involved. Certainly the absence of elaborate equipment for investigation removed one possible source of aggravation of the symptoms. The low diet was not altogether without compensation. There were no cases of death from hypertension; blood pressures were universally low despite the fact that we had a fair proportion of elderly men who were sent to Singapore to defend Australia, and of course the Dutch had a cross-section of all males up to sixty years of age. On the other hand, the low resistance of the body was in evidence on the operating table quite often. A quiet peptic ulcer would perforate and necrosis or local gangrene would be the main feature, a large hole with none of the usual inflammatory reaction around it. The same applied to the appendix. It might burst without giving much warning. So these reactions of nature which are of so much importance in diagnosis and also as means of natural cure were frequently in abeyance. Consequently the clinician had to keep a sharp lookout for early signs of trouble. For this reason many patients who might have recovered by conservative measures were submitted to appendicectomy because we could not take the risk of allowing a quietly smouldering appendix to advance to perforation and peritonitis. When such a catastrophe occurred, surgery was too late.

Rehabilitation, moral and physical, commenced early in 1944. The happiest men in the camp were the limbless men, many of whom were employed making bags,

cigarettes and artificial limbs. They had no complexes and, like the rest of us, rejoiced in simple pleasures. The low diet discouraged excesses of all kinds. By 1945, 170 limbless men were fitted with wooden legs, many ingeniously constructed with knee and ankle flexion devices. These men, by their fortitude, patience and high morale, helped in a large measure to comfort and console the weaker spirits during the long weary months of waiting. Functional nervous disorders were relatively rare among the Anglo-Saxon prisoners of war. There were some cases of hysteria among the Dutch.

No paper on medical work in prisoner-of-war camps would be complete without a reference to the combatant officers and other ranks who, like management committees and auxiliaries of civil hospitals, contributed to the success of the organization. After the capitulation of the Japanese we handed over our charges to R.A.P.W.I. and were released from our medical obligations. We regretted that some of our patients had been denied modern facilities while under our care, but we were comforted in the knowledge that they would henceforth be the recipients of all that modern medicine and its ancillary services could provide. The management of the sick prisoner of war was the function of the physician. He knew his patient's background from daily association, a common mode of life, and often a personal experience of his disease. He had plenty of time during the long tropical nights to contemplate his problem. He used his eyes, his ears, his hands and even his olfactory sense. He became accustomed to listen patiently to the recital of symptoms. Rest in the recumbent position, the exhibition of the few available specific drugs, the husbanding of the patient's natural resources, dietetic adjustments, if possible, hygienic precautions, graduated exercise and moral encouragement, these were the fundamental methods employed. Surgery, physical therapy, mechanical and psychological aids were invoked as required to assist mother medicine. These principles were learned at the bedside in student days. They form a major part of that heritage of British medicine of which we are justly proud. The application of simple clinical methods enabled us to save some lives, to restore health and, where that was not possible, to comfort and console many of the poor fellows in our camp hospitals.

We pay a tribute to our clinical teachers. Some of them fired us in early days of our training with a zeal for our profession. Sir Richard himself served his country in the windswept and inhospitable tented hospital on Lemnos Island in 1915. He gave of his best for the soldiers and sailors who came under his care. He endured hardships, he adapted himself to the peculiar circumstances of war. I am reminded of our Anzac Day ceremony at Nakomatom hospital in 1944. After much argument with the Japanese and their submission on a suggestion of one of our Australian officers that we would pray for their compatriots who fought with us in 1914, we held a service. The Japanese insisted on their interpreter being present. The padre read a lesson from the Epistle to the Hebrews describing the men of faith who lived in holes in the ground, were clad in sheepskins and goatskins, and who were men of whom the world was not worthy. As I was the senior officer who had been present at Anzac, it was my duty to give the address. I concluded with a paraphrase of the words from "Invictus": "In the fell clutch of circumstance we have not winced nor cried aloud; under the bludgeonings of chance our heads are bloody but unbowed." Some of my colleagues whispered that these remarks cut a little close to the bone, but our custodians took no action. In fact it is my impression that any respect we won from our captors was due to a straightforward attitude.

I, as other prisoners of war, very occasionally was shown kindness by a Japanese doctor or ordinary soldier, but rarely within the confines of the prison camp. I believe that there were Japanese medical officers who were capable of showing human sympathies, but when acting as a small part of a soulless military machine they were afraid to show their normal reactions. They wore the sword of the Samurai and arrogantly asserted their authority. In con-

trast, we prisoner-of-war doctors preserved some semblance of dignity even in our rags and required no outward show of pomp and power to inspire in our patients confidence and trust. We were doctors first and dealt with individuals, but a display of righteous indignation towards our custodians now and then was more than justified. In 1943, during the jungle pilgrimage, the utter neglect of the sick prisoners of war and the absolute failure to provide even the meaneast succour for these casualties is a lasting disgrace to people who boasted of being the gentlemen of the Orient. The half-hearted attempt to set up a medical service in 1944-1945 can be interpreted as a face-saver, in view of the changing fortunes of war. These matters will be ventilated shortly in Japan.

Despised by the powers in control, during our time of captivity we often remembered the words: "I was sick and in prison and ye visited me." We were sustained in the knowledge that we were carrying on the tradition of British medicine. We were painfully aware of the lack of diagnostic and therapeutic facilities in our prisoner-of-war hospitals, yet I am persuaded that the sharpening of the clinical sense, the improved judgement, self-reliance and improvising ability developed by many of our medical officers were compensations of some redeeming value.

For the basic training in clinical medicine in its simple, direct and most generally useful form we are indebted to a long line of practising physicians and surgeons. Many of us remember with affection, respect and gratitude a great Australian physician, and we are pleased to record that in the dark days we were able to apply fundamental principles in medical practice.

#### A MALARIA SURVEY AT WEWAK, NEW GUINEA.

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COASTAL New Guinea and the adjacent islands are almost entirely areas of hyperendemic malaria, with local epidemiological characteristics which have become fairly well known in the course of time. Before the war, numerous spleen surveys and several parasite surveys had been made by the Dutch in the west and by Australians, notably Heydon (1923), in the east (reviewed by Ford, 1943), while infection rates in the mosquitoes had been determined by Heydon (1923) and by de Rook (quoted by Swellengrebel and Rodenwaldt, 1932). During the war our knowledge was rapidly extended, and in the course of discussion reference will have to be made to some of the extensive unpublished investigations of Australian and American service workers in this country. So far as we are aware, however, no fairly complete, quantitative cross-section of a malarial situation in New Guinea has been described since Heydon's pioneering work in New Britain, and it therefore seems desirable to record the results of the present survey, although there is not a great deal that is novel or unusual in them.

The Australian forces in action between Aitape and Wewak had suffered an unexpectedly high though not disabling incidence of malaria, the reasons for which were obscure. The Director of Medicine of the Australian Military Forces, Brigadier N. Hamilton Fairley, undertook a special field and experimental investigation of the infections in our troops and of the strains of parasites involved (Fairley, 1946). The survey here reported was made to provide an epidemiological background for Brigadier Fairley's studies and for some more general field investigations which were in progress. It will not, however, be discussed here in relation to the special problem, but purely as a general contribution to local epidemiology.

#### Population and Environment.

Wewak lies on the north coast of New Guinea at 3° 34' south latitude and 143° 38' east longitude. The area chosen for the survey was a group of refugee native villages

situated at the mouth of the Hwain river, ten miles west of the town site. These formed a community of something over 1,000 men, women and children, who had formerly lived in scattered villages on the coast, on the small, closely adjacent islands, and on the coastal foothills of the Prince Alexander Range—all, however, within the general Wewak district. They had previously been subject to the epidemiological influence of contact with the Japanese, and later, briefly, of our own troops, but had been comparatively stabilized and isolated for something over two months prior to the survey. Many had suffered from malnutrition and disease (particularly untreated yaws); but at the time of examination the great majority were in good physical condition.

The coastal strip in that part of the country consists of a narrow, low sand ridge, twenty to fifty yards wide, behind the beach, along which the village is strung, backed by extensive, impenetrable Nipa swamps. These swamps vary in width from a hundred yards or so up to several miles, and lie practically at sea-level, being strongly under tidal influence. The streams from the hills lose themselves in the swamps, wandering through them with meandering, vaguely defined courses, and entering the sea at inconstant and changeable openings. A few more important rivers cut through, with heaped-up banks and well-defined courses. Anophelines abound in this strip. The foothills are fairly steep, moderately dissected, and for the most part densely covered with rain forest, but generally drier than the coast, though subject to seepage, pool and stream breeding. In the area immediately adjacent to Wewak and east of it are several coconut plantations. Anophelines were not so numerous there as on the coast.

The climate of the area is equatorial, with little variation in temperature, either diurnal or annual. It is strongly influenced by the north-west monsoon, which comes in, vigorous and moisture-laden, from the sea, closes the outlets, and banks back the water in the swamps. This coast receives considerable orographic protection from the south-east trade winds, but a substantial component curves round the north of New Guinea and reaches the area from the east. The most important winds from the malarial point of view are the tail of the diurnal sea breeze fading towards midnight, and the light katabatic and off-shore airs which drift down from the foothills to the coast in the early morning hours until turbulence begins after sunrise.

The rainfall is 87 inches *per annum*, and its mean monthly distribution is shown in Graph I. From what we know of malaria in relation to climate in New Guinea, it is safe to presume that transmission is perennial, with but little seasonal variation.

#### Methods.

##### General.

The basic procedure used in nearly all our work in New Guinea has been the spot survey—that is to say, a cross-section of the situation in a community made at a single instant of time. The brevity of that instant was dictated, not only by theoretical reasons, but by many practical considerations, for we rarely had more than a few hours in which to collect in the field all the information we could. For this reason the following points in planning became very important.

1. The population was usually sampled, not examined as a whole, the size of the sample being determined primarily by the time known to be available, seventy persons per hour being taken as the number that could be handled efficiently by a team of three. This introduced the responsibility that the sample had to be random, which was generally achieved by arranging beforehand that a properly representative aliquot from each section of the community be marshalled for examination. Alternatively, the whole community could be marshalled, and the aliquot from each section drafted off by taking every second or third individual according to the number required. This is more reliable, but takes more time.

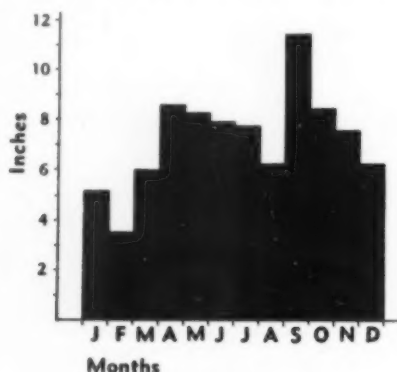
2. It was necessary to have well-coordinated, smoothly running team work to maintain the standard seventy per hour, a most valuable adjunct to the team being an intel-



ligent police boy to keep the flow of subjects moving swiftly and evenly.

3. It was necessary, too, to reduce the actual procedures used to the limit of simplification. Schüffner's modified method of recording spleens (Hackett, 1937, Figure 31) is admirable for the purpose, and gives all the data that can be used profitably in the circumstances; but we had to develop the technique of blood examinations in some respects, and these will therefore be described below in some detail.

4. In the present survey, "blitz" methods were used to collect the mosquitoes—all-night sessions with every available white (five in this instance) aided by a number of



GRAPH I.  
Mean monthly rainfall histogram for Wewak, based on records for seven years (Allied Geographical Section, 1943).

bright, keen-eyed, eager native youngsters,<sup>1</sup> with the greatest available concentration of sleeping villagers as bait.

One word may be introduced here which is applicable to all the examinations. Age is often an unknown quantity in these natives, so it is necessary to adopt somewhat arbitrary standards: (i) "infants" are those normally carried in their mothers' arms, their age ranging from a few weeks up to about fifteen months; (ii) "children" are rated from the smallest who will walk in unaided (about two years) to those at puberty (about twelve years); (iii) "adults" are all full grown and mature. This classification omits the adolescents and makes a well-defined division between the children and the adults. Adolescents may be introduced as a special group if desired; but they are usually not particularly illuminating, and were not included in this or in most of our surveys.

#### Spleens.

The subjects were all examined lying on the back, with the knees drawn up. This is not normal procedure, but one finds it impossible to palpate muscular adults accurately when they are standing, and one feels more satisfied with the accuracy of the records of children, too, when their bellies are relaxed. Infants were examined while held comfortably in their mothers' arms; if one is careful, slow and gentle, the percentage of "screamers" who will not relax is not large. As has been stated earlier, the modified Schüffner classification was used, and the average enlarged spleen was expressed in the same notation.

#### The Parasite Survey.

The method used is based, like several that have been described, on the well-known Breed count. It was developed first in a crude form by one of us (I.M.M.) and given precision by Backhouse (unpublished Australian army report). It has the advantages of speed, of sufficient

<sup>1</sup> One cannot use the word "boys", for men are "boys" and children are "monkeys" in New Guinea, while babies are "piccaninnies".

accuracy for the purpose, and of achieving a great saving in slides, staining time and time required for changing slides and refocusing during the examination. The equipment needed comprises the following: (i) loops one millimetre in diameter made from number 30 standard wire gauge wire; they may be prepared by taking a strand of wire from an ordinary fly-wire gauze screen, folding it round the shaft of a number 16 hypodermic needle, twisting it tightly, and then withdrawing the needle; (ii) a guide card, with a circle exactly five millimetres in diameter on it, and marked with lines to facilitate even spacing of the drops (Figure I, A); (iii) a writing diamond to number the slides (grease pencil is too easily rubbed off); (iv) ether, wool, Petri dishes, stains *et cetera*.

Before a start is made, the first number of the group is written with the diamond at the top left-hand corner of the slide (which must be scrupulously clean); the slide is placed on the guide card as in the diagram (Figure I) and covered with a Petri dish lid to keep out dust. The surface used (table or box) should be reasonably flat, so that the drops will dry evenly.

While the spleen is being palpated, an assistant cleans the finger and pricks it as soon as the spleen class is called. The loop is dipped in the drop of blood expressed, one cubic millimetre being picked up; this is then quickly spread in a five millimetre circle on the slide, the ring

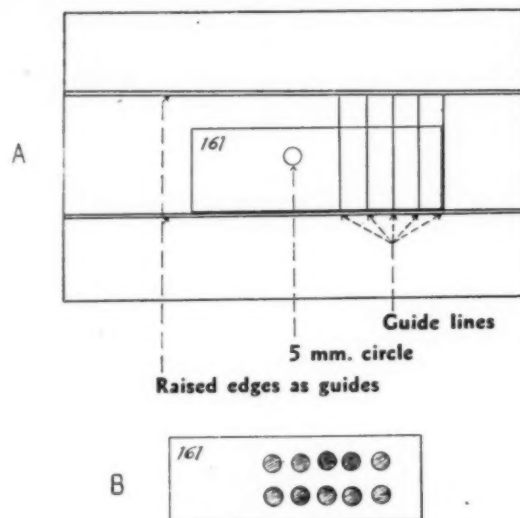


FIGURE I.

A: The guide card used in parasite surveys, with slide in position for first spot. B: The slide as it appears when complete.

beneath being used as a guide, and the eye being kept vertically above the spot to eliminate error due to parallax. It is best to spread the blood round the margin of the circle first, then work inwards, and finally roll the loop to get rid of the last film of blood; a touch here and there may be needed to correct irregularities in thickness. The slide is moved to the next position (Backhouse uses a guide card with ten circles marked on it and the slide held fixed, which is probably quicker), the Petri lid is replaced, the loop is rinsed, shaken and quickly flamed, and all is ready for the next subject.

When the slide has its complement of ten spots, arranged consecutively as in Figure I, B, it is put aside in a flat box, covered, left to dry, and the next slide is placed on the guide card. A single investigator, with an assistant to clean and prick fingers, a second to record, change slides *et cetera*, and a native orderly or police boy to marshal the villagers, can, as was indicated earlier, collect spleen records and blood spots at the rate of 70 per hour, sometimes up to 90 if everything runs smoothly.

After the survey is complete and all the spots are dry, the slides are slowly heated on a metal surface over a spirit lamp until the spots develop a distinctly brownish tint. They should not be "cooked" too quickly or too much; but the heat is such that the slides cannot be handled with comfort. This method, devised by M. J. Mackerras, ensures that spots will not be lost in staining, and helps to fix the parasites crisply without affecting the solubility of the haemoglobin. They are stained immediately in the field, unless one can return to the laboratory in an hour or two, for even heat-fixed slides keep poorly in the wet tropics.

In this type of survey work, it is essential that the haemoglobin be removed fairly completely and the parasites well stained everywhere in the spot, so a modification of the ordinary Field technique (Field, 1941) is necessary. Two modifications have been employed, as follows. (i) The slide is dipped for two or three seconds in Field A stain, rinsed, stood on edge to drain and dehaemoglobinized for thirty seconds, dipped in Field B stain for one or two seconds, rinsed, and again dipped in Field A stain for one or two seconds and rinsed, before being stood on edge to dry (Backhouse). (ii) The slide is stained normally in Field stain, and either immediately, or more conveniently after return to the laboratory, covered with 1 in 20 to 1 in 30 Leishman stain for five to ten minutes (according to the quality of the stain), rinsed and dried. Both methods are good, the first probably the better. We have not had an opportunity yet to try the modification of the Leishman procedure recently described by Fenton and Innes (1945), but it reads as if it should be eminently suited to this purpose.

In the laboratory, the whole of each spot is searched, whether parasites are found early or not, so that the records represent all species detectable in one cubic millimetre of blood. This is somewhat laborious, but not unduly so, and it seems a sound general standard to adopt for survey work. The slides will keep well in the dark with a desiccant, and the pressure of time is in their collection, not in their examination. To enumerate the parasites, sufficient fields are counted and averaged to give the number of parasites per field, convenient numbers of fields being as follows (Table I):

TABLE I.

Parasites per Cubic Millimetre.	Fields Counted.
> 10,000	5
10,000 to 1,000	10
1,000 to 200	20
200 to 20	40
< 20	Whole slide

Then the number of parasites per cubic millimetre is the average number per field multiplied by  $\frac{137}{22 \times (\text{field radius})^2}$

With ordinary equipment (two millimetres objective,  $\times 5$  or  $\times 6$  ocular lens, and tube length of 160 or 170 millimetres), the factor represented by the right-hand fraction usually works out at something between 630 and 650.

TABLE II.  
Spleen and Parasite Rates.

Observation.	73 <sup>1</sup> Hwain Infants.	100 Hwain Children.	100 Hwain Women.	100 Hwain Men.	200 Japanese, Wewak.	524 Australians, <sup>2</sup> Wewak.
Spleen rate .. .. .	93%	92%	60%	55%	8%	10%
Average enlargement of spleen .. .. .	2.2	1.5	1.2	1.0	0.5	—
Parasite rate .. .. .	92%	59%	33%	29%	47%	5%
Infection rate .. .. .	130%	71%	35%	32%	57%	5%
Gametocyte rate .. .. .	49%	16%	5%	6%	22%	2.5%

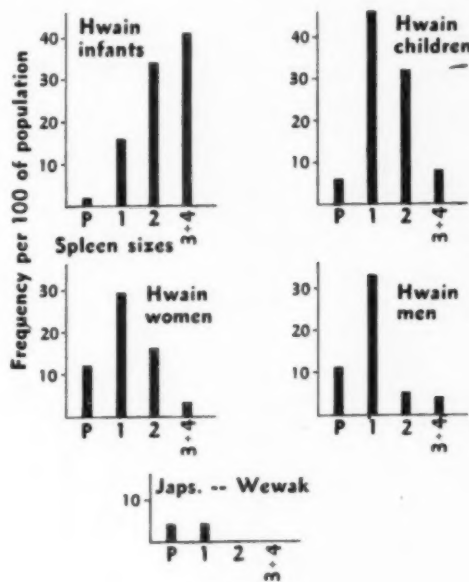
<sup>1</sup> The spleen rate is based on 61 infants, the remainder being "screamers" who could not be palpated.

<sup>2</sup> Figures from Major I. C. Macdonald and Major J. I. Tonge.

As a check, or as an alternative method of calibration if a stage micrometer is not available, an accurate white cell count is made on a convenient subject, ten standard spots are spread at the same time, and the white cells are counted in twenty random fields in each spot. Then:

$$\text{Factor} = \frac{\text{total white cell count per cubic millimetre}}{\text{average number of white cells per field}}$$

As an example, in a check made at Wewak, the white cell count was 9,800 per cubic millimetre and two series of spots were prepared and counted by different observers, the results being as follows: (i) Major J. I. Tonge: maximum 15.5, minimum 13.7, mean 14.9; (ii) I.M.M.: maximum 17, minimum 13, mean 15.2. The mean white cells per field, as calculated from the known field radius, should have been 15; the result was satisfactory agreement.

GRAPH II.  
Histogram of spleen sizes.

This method of counting parasites is sufficiently accurate for the purpose, for we are concerned not with precise numbers, which in any case have little meaning in this type of work, but with orders of magnitude (*vide* Graphs IV to VI). It may be noted that reasonable total and differential white cell surveys may be made on these spots, and it is hoped later to publish some of the results obtained from them.

#### Mosquito Dissections.

All the mosquitoes were collected on the same night, kept in Barraud cages covered with moist towels, and given carbohydrate food. All were dissected within the

next three days. The method of dissection was that developed by Roberts and used by the Land Headquarters Medical Research Unit, Cairns (M. J. Mackerras and Allman, unpublished Australian army report), the main features of which comprise freeing of the glands by "decapitation and pressure on the thorax," and drawing of the gut on a dry slide. In addition, ovaries were classified for age.

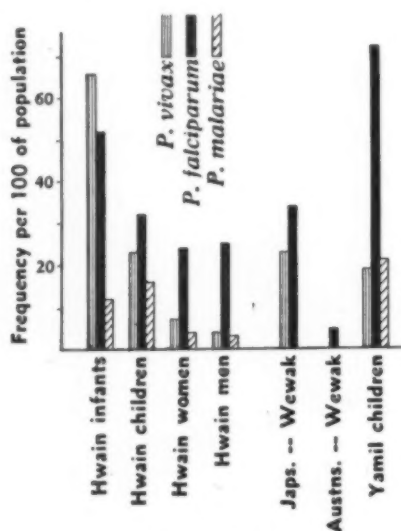
### Results.

#### Spleens.

The results of the spleen survey are shown in Table II and Graph II, which include, in addition to those of the natives, certain other records to be discussed more fully later.

The salient features of the spleen records are as follows:

1. The sudden reduction in size of the spleen and change in the form of the histogram between the infants and children, the findings in the latter being essentially similar to those in the adults, although their rates were higher.



GRAPH III.  
Frequency of the species of parasites.

2. The large number of enormous spleens in very young infants. These are not shown in the figures, but were most striking at examination, many tiny babies two or three months old having spleens extending far into the right iliac fossa. These large spleens were firm and sharply defined, and did not feel like the soft, turgid spleens of acute malaria. Nevertheless, some tense spleens were noticed both in infants and in children, and, to judge by the patients' reactions, a few of these were tender.

3. The slight but distinct difference between women and men. This is not statistically significant in this particular instance, but is worth noting in relation to findings elsewhere.

#### Parasites.

The results are set out in Tables II to IV and in Graphs III to V. Again, certain additional records are included for later discussion. Points for remark are as follows:

1. The decline with age in parasite and gametocyte rates; there is, however, little difference between those of women and those of men (Table II).

<sup>1</sup>This development of the old procedure of drawing the glands out with the head seems to have been evolved independently by a number of workers (Shute, Blacklock and Wilson *et cetera*), but the first published reference to it seems to have been by Shute (1940).

2. The changes with age in the incidence and relative proportion of the species (Graph III).

3. The change with age in the relationship between splenic enlargement and parasite carriers (Table III). The figures are not large, but they are consistent, and are simply another reflection of the developing immunity.

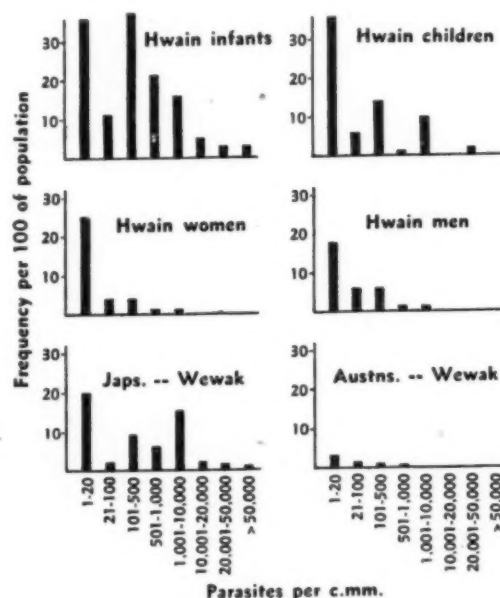
4. The decline in parasite abundance with age (Graph IV). It may be noted that some infants and an occasional

TABLE III.  
Parasite Rates Related to Enlargement of the Spleen.

Group.	Parasite Rates.		A : B.
	Group A. Spleens Not Enlarged.	Group B. Spleens Enlarged.	
Hwain infants .. .. .	25%	95%	1 : 3.8
Hwain and Yamil children ..	54%	64%	1 : 1.2
Hwain adults .. .. .	28%	30%	1 : 1.1
Japanese, Wewak .. .. .	46%	63%	1 : 1.4

child tolerated amazingly high numbers of parasites (*Plasmodium vivax* up to 45,000 per cubic millimetre, *Plasmodium falciparum* from 75,000 to more than 100,000 per cubic millimetre) with astonishingly little apparent clinical effect.

5. The tendency for *Plasmodium vivax* to run parallel with *Plasmodium falciparum* in the middle range of abundance, the latter being characterized by the usual more pronounced extension into hyperinfections, and for



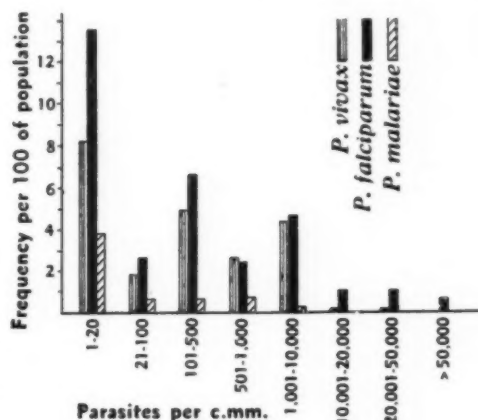
GRAPH IV.  
Histogram of total parasite counts.

*Plasmodium malariae* to produce almost always a relatively scanty infection (Graph V). Infections in the Japanese as well as in the natives have been used in the construction of this graph, as it may be seen from Graphs III and IV that, except in the absence of *Plasmodium malariae*, Japanese do not differ significantly from the Hwain children.



6. Variation with age in the proportion of mixed infections. The percentages of the respective populations with mixed infections were as follows: infants 36%, including 1% with treble infections; children 9%, including 3% with treble infections; adults 3%, no treble infections; Japanese 10%, no treble infections; Australians, none; Yamil children 33%, including 5% treble infections.

7. The absence of unusual findings in parasite morphology, except perhaps a relatively high proportion of *tenuis* forms of *Plasmodium falciparum*. However, this may be more apparent than real, and may have been due to distortion produced by fixation, as alcohol-ether had to be used on a number of the thin smears made from infants and children. There is a strong tendency in these natives,



GRAPH V.

Histogram of the parasite species in 573 subjects: *Plasmodium vivax*, 128 (37%); *Plasmodium falciparum*, 188 (54%); *Plasmodium malariae*, 32 (9%).

especially in the young ones (as elsewhere in New Guinea), for more advanced stages of *Plasmodium falciparum* to appear in the peripheral blood than one normally sees in that of whites. Large rings and plump rings with a distinct trace of pigment are frequent, young trophozoites of solid form are not uncommon, and even advanced trophozoites and schizonts are occasionally seen in the blood of children who are not obviously ill. Finally, although it is commonplace at any rate in New Guinea natives, one can never fail to remark on the high proportion of schizonts one sees in quartan infections, even in scanty infections. It would almost seem as if the parasite lingers in the schizont stage, and possibly the schizonts may correspond to the "crisis segmenters" described by Taliaferro and Taliaferro (1944) in *Plasmodium brasilianum*, although their appearance was perfectly normal.

8. The gametocyte numbers, which are of the greatest interest. The crude rates—that is, the percentages of any gametocytes in one cubic millimetre of blood—are shown in Table II; but more significant are the rates for *Plasmodium falciparum* crescents more numerous than 40 per cubic millimetre and for *Plasmodium vivax* gametocytes more numerous than 10 per cubic millimetre. These are set out in Table IV, and the distribution of gametocyte numbers is shown in Graph VI. These figures will be discussed in some detail below, so need not be considered further at this point.

#### Entomological Observations and Infections in Mosquitoes.

*Anopheles punctulatus* Don., the only species found in the Wewak area, has been divided into three forms, two of which are recognized as subspecies (Lee and Woodhill, 1944). These are *Anopheles punctulatus punctulatus* Don., *Anopheles punctulatus farauti* Lav. (*moluccensis* Sw.), and *Anopheles punctulatus intermediate*, which Woodhill

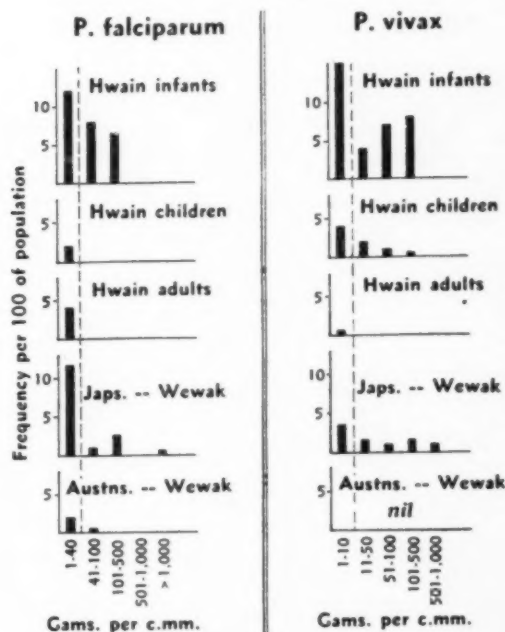
(1946) regards as a hybrid between the other two.<sup>1</sup> The catches at Hwain river and also elsewhere in the district, comprised 98% *Anopheles punctulatus farauti* and 2% *Anopheles punctulatus intermediate*, only one example of *Anopheles punctulatus punctulatus* being found in several hundreds examined.

TABLE IV.  
Critical Gametocyte Rates.

Group.	Gametocytes.	
	<i>Plasmodium falciparum</i> , > 40 per Cubic Millimetre.	<i>Plasmodium vivax</i> , > 10 per Cubic Millimetre.
Hwain infants	4.5%	19%
Hwain children	0%	4%
Hwain adults	0%	0%
Japanese, Wewak	4%	5%
Australians, Wewak <sup>1</sup>	0.6%	0%

<sup>1</sup>Figures from Major I. C. Macdonald and Major J. I. Tonge.

All the Anophelines in the Hwain river series were collected at night between 7 p.m. and 3 a.m., by which time the cages were becoming crowded and collection was stopped. A few were captured on the wing with nets, but the great majority were taken whilst resting on the walls, beds and mosquito nets (possessed by some natives) and a few while feeding on the sleeping natives. At



GRAPH VI.

Histograms of numbers of gametocytes.

subsequent examination it was found that half were engorged and half had empty stomachs or contained only a trace of old blood. The greatest numbers were in three hospital wards, and two collectors worked in these continuously, making regular half-hourly counts of their catches. The curve of increasing abundance throughout

<sup>1</sup> American workers treat these forms as three distinct species, which they name respectively *Anopheles punctulatus* Don., *Anopheles farauti* Lav. (having priority over *moluccensis* Sw.), and *Anopheles koliensis* Owen.

the night is shown in Graph VII. During a subsequent visit the huts were searched during the day for resting adults, but not one was found. This confirmed the earlier observations of Atherton and Lemerle, Roberts and O'Sullivan and others (unpublished Australian army reports) that this species is essentially a house visitor and not a house dweller.

Dissections began at noon next day and ceased towards the end of the third day. All the mosquitoes recorded were *Anopheles punctulatus farauti*, the few intermediates present being excluded. The results, with others from the district for comparison, are set out in Table V.



GRAPH VII.

Half-hourly catches of Anophelines in native hospital, Hwain river.

The age of the Anophelines was determined by Roberts and O'Sullivan's modification (unpublished Australian army report) of Christophers's system (Christophers, Sinton and Covell, 1944) of classifying ovarian development. The wing scaling was not employed, as these and other workers have shown that it is of little value in New Guinea, some Anophelines known to be young having very ragged wings, while others with sporozoites in the glands, and therefore at least ten days old, have perfect wings. The modification referred to is in the classification of stage II, which is subdivided into three sections: IIA: small amount of yolk, nucleus of ovum clear, no traces of oviducal canal; IIB: small amount of yolk, nucleus of ovum clear, oviducal canal very distinct; IIC: yolk heavier, extending to half the cell, nucleus of ovum still moderately clear (this stage links stages II

and III). The virtue of the classification was considered to be that IIA ovaries indicated young mosquitoes which had not oviposited previously, whereas those with IIB ovaries had laid a previous batch of eggs and were therefore more than five days old.<sup>1</sup> Dissections of part of the Hwain river catch are shown in Table VI.

#### Discussion.

Schüffner (1919-1938) distinguished clearly between two types of hyperendemic malaria: (i) severely hyperendemic malaria, in which spleen rates are as high in adults as in children and the spleen size increases with age; (ii) moderately hyperendemic malaria, in which both spleen rates and sizes, after reaching a maximum (usually between the ages of three and six years), decline steadily with age. Severely hyperendemic malaria has been recorded only in areas of perennial transmission, while moderately hyperendemic malaria is, generally, though not invariably, associated with seasonal transmission. Schüffner illustrates the two types with examples from Sumatra and Central Africa, his figures being shown graphically in Graph VIII. It may be noted that the African example is extreme, and is probably influenced by racial peculiarities; the fall in rates with age in this type of malaria is usually steadier and less extreme.

Approximations to both types occur in the Austro-Malayan subregion. The Admiralty Islands (Graph VIII) and Milne Bay findings (I.M.M., unpublished) may be taken to indicate severely hyperendemic malaria, though in the adults the spleens have not such high rates or such large sizes as at Mandailing. Examples of moderate hyperendemicity are more numerous; Lalapipi on the south and Lae on the north-east coasts are areas shown in the graph, and northern Bougainville (unpublished Australian army report) may be mentioned as another. On the criteria adopted, Wewak would fall in the moderately hyperendemic range, though probably near its top.

The two grades are not well distinguished parasitologically, as in both there occur the normal decline in parasite and gametocyte rates and numbers, and the normal change in relative proportions of the parasite species (Tables II and IV, Graphs III, IV and VI). Severely hyperendemic malaria, however, tends to produce higher rates and greater numbers of parasites per cubic millimetre than the moderate type, and in this respect the Wewak findings would place it within the former rather than the latter category, though comparisons are difficult

<sup>1</sup> Dissections subsequently made at Cairns by one of us (J.E.C.A.) throw some doubt on the general validity of this conclusion so far as IIA ovaries are concerned, though it is probably broadly true for mosquitoes with IIB ovaries.

TABLE V.  
Mosquito Dissections.

Group.	Number Dissected.	Oocyst Rate.	Sporozoite Rate.	Filaria Embryos. <sup>2</sup>
Hwain river villages, July .. .. .	200	3.5%	2.0%	3.0%
Wewak—native labour compound, June (O'Sullivan) <sup>1</sup> ..	155	0%	0.6%	0%
Wewak—troop encampments, July <sup>1</sup> .. .. .	320	0.3%	0%	0%
Wewak—troop encampments, August and September, <sup>2</sup> ..	721	0%	0%	0%

<sup>1</sup> Control in the Wewak area began at the end of May.

<sup>2</sup> The August-September catches include 186 from camps fairly near to native quarters.

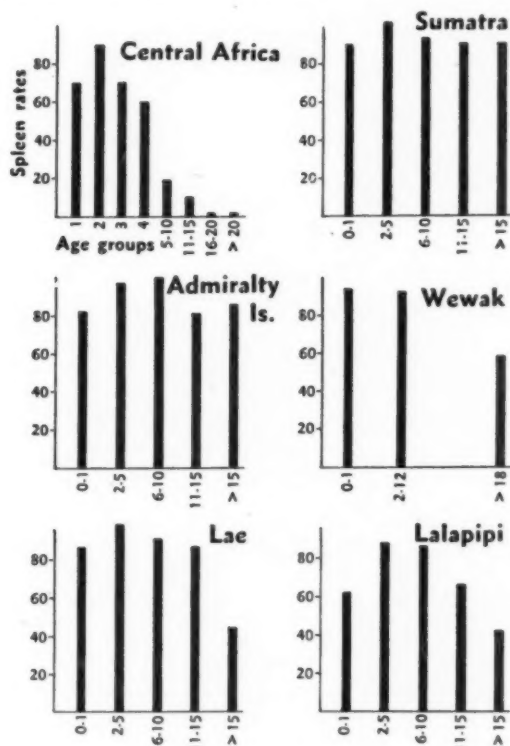
<sup>3</sup> The filariae were presumably *Wuchereria bancrofti*, and were all in the elongate, infective stage; no thoracic dissections were made.

TABLE VI.  
Classification of Ovaries, Hwain River Mosquitoes.

Group.	I.	IIA.	IIB.	IIC.	III.	IV.	V.	II+V.	Total.
Dissected first day—									
Not engorged .. .. .	2	17	12	1	0	0	0	0	32
Engorged .. .. .	0	7	12	3	8	0	0	1	31
Dissected third day .. .. .	0	6	5	1	0	1	23	2	38

because of the different standards that have been adopted by different workers.

On the other hand, the parasite picture does provide a delicate indication of any upset in the epidemiological situation. It was stated earlier that the Hwain river population had become reasonably stabilized, and this is supported by the parasite findings. The data from a small group of children from Yamil are included in Graph III, because they provide an interesting contrast. Yamil lies on the southern (Sepik) slopes of the Prince Alexander ranges, south of Wewak. The country is deeply dissected, with small, flat tops on the ridges, which are the only places where the inhabitants can live or troop positions be maintained. The result was a mosaic of refugee native groups and our troop positions and the enemy's, so that a maximum interchange of infection between all three



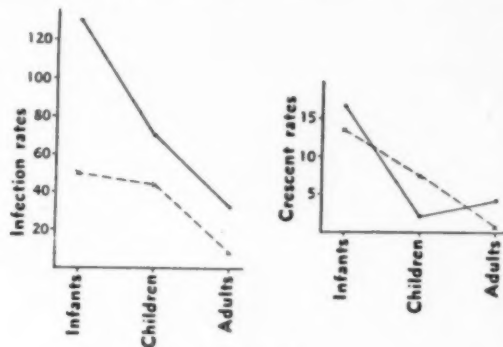
GRAPH VIII.

Relation of spleen rates to age in Central Africa and Mandailing, Sumatra (Schüffner, 1919-1938), in the Admiralty Islands and Lalapipi (Bang *et alii*, unpublished United States army report), in Lae (Backhouse, unpublished Australian army report), and in Wewak.

elements was inevitable. The natives in question had been particularly exposed to the epidemiological influence of the Japanese, and the abnormally high *Plasmodium falciparum* rate shown in the graph is believed to have been the result.

There is one unusual feature in the Wewak results, and that is the great rapidity with which immunity in these people is manifest in a reduction both in the number of parasites and in spleen rate. This is evident from the graphs and tables, and is further illustrated by comparison with Schüffner's findings (recalculated to include the corresponding groups) in Graph IX. Normally, numbers of parasites and spleen rates reach their maximum in the third to fifth year; here they are at their highest in the first year of life. Actually, the infants were not examined at the first visit, and it was the extraordinary scantiness of gametocytes in the children's blood that sent us back

a week or two later to seek further for the source of infection in the community. Associated with the rapid development of immunity are an unusual tolerance of heavy infections (*vide supra*) and a suggestion that many infants may be born with large spleens. This peculiarity in the local situation complicates the epidemiological picture, and raises the suggestion that we may be dealing with what is really a severely hyperendemic state, masked either by actively antigenic local strains of parasites or by peculiarities in local racial immunity.



GRAPH IX.

A comparison of infection rates and crescent rates from Sumatra (Schüffner) and Wewak. (On account of the different techniques used, only the trends can be compared, not the levels.)

Some further light might be thrown on this problem if we could assess the frequency of transmission in the area. This is difficult. Manalang (1931) made the most logical observations on *Anopheles minimus (funestus)* in the Philippines by using a man-baited trap and assuming that all that entered would have fed. On this basis he calculated that an average individual would receive a fresh infection every 1.4 to 3.5 days, according to season. Unfortunately, *Anopheles punctulatus* will not enter such traps, nor will they remain sitting round long enough to be counted with any pretence of accuracy.

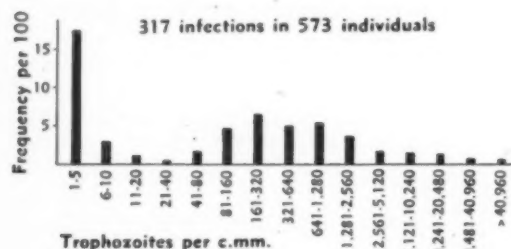
Between 7 p.m. and 3 a.m. we captured 843 individuals with approximately 50 natives as bait, and the rate of capture was still rising at the end (Graph VII). This represents something more than fifteen per native per night, if all the mosquitoes were assumed to bite, which they probably would do. However, a great number were undoubtedly missed, some because they rested in hidden places, others because they entered, fed and departed immediately without waiting to be captured. Waterhouse estimated that about 20% of the feeding population remained in tents up to twenty minutes before or after feeding, and Roberts at Salamaua, under conditions more comparable with ours, found up to 59% resting for various periods (unpublished Australian army reports). We feel that it is safe to assume that we captured less than 50% of those that came to feed. With the 2% sporozoite rate recorded, this would give about three or four as a conservative estimate of the number of fresh infections received weekly by an average individual in the community.

This is admittedly a crude estimate; but it certainly represents a fairly heavy rate of infection, and one which probably goes on all the year round, for there is little annual climatic variation to influence it. However, we have no standards of comparison. The rate is of the same order as Manalang's transmission rates in the Philippines, but is low by comparison with Mer's (personal communication) frequency of three infections per night from *Anopheles clutus* in the Hula Valley, Palestine, during the malaria season. *Anopheles punctulatus farauti* seems to be completely indifferent in its choice of hosts (Heydon, unpublished Australian army report), so we may suspect that it would not be so efficient as more anthropophilic



forms like *Anopheles punctulatus punctulatus* and *Anopheles sundatus*—which incidentally have other habits rendering them particularly dangerous; but we do not know, and this line of inquiry cannot be pursued profitably until more information has been obtained about transmission frequencies by different vectors under various epidemiological conditions.

A subsidiary point emerged from the parasitological studies, which we do not remember to have seen discussed previously. It will be noted in Graph IV that all the frequency curves of parasite numbers have a double wave, with a trough between the very low and moderate numbers. To check this, all the trophozoite counts from the natives and Japanese (which Graphs IV shows to be essentially similar) have been assembled with narrower intervals in Graph X. Here the trough is very clear, the minimum lying in the 20 to 40 parasites per cubic millimetre range. This, we believe, represents the turning point between infections which are "suppressed" by immunity and those which are parasitologically overt. Whether the same end point for immunological suppression would hold for other communities we do not know; it certainly does not apply to "Atebrin" suppression, which is shown by both the Cairns investigations and field experience normally to hold the parasites at much lower levels.



GRAPH X.  
Histogram of numbers of trophozoites for all natives and Japanese examined.

The last point to discuss is the important point of the sources of infection in the community. Crude gametocyte rates are unsatisfactory for this analysis, for infectivity of gametocytes depends both on their numbers and on their "maturity"—by which is meant that assemblage of qualities which make them "good" or "bad" infectors, as James (1926) called them. We cannot recognize good infectors by means that can be used in surveys; but we can reduce our crude rates to something much nearer real values by omitting carriers in whom the gametocytes do not reach infecting concentrations.<sup>1</sup>

M. J. Mackerras at Cairns (personal communication) has obtained a 40% sporozoite rate from a *Plasmodium falciparum* infection with 30 crescents per cubic millimetre, and a 20% sporozoite rate from *Plasmodium vivax* gametocytes at 24 per cubic millimetre. Green (1929) gives 42 per cubic millimetre as the minimum for *Plasmodium falciparum* and 10 per cubic millimetre for *Plasmodium vivax*. Boyd and Kitchen (1937) found few *Plasmodium falciparum* infections when crescents numbered less than 100 per cubic millimetre, but recorded the minimal infecting dose for *Plasmodium vivax* as 10 per cubic millimetre, while Boyd (1942) records finding *Plasmodium vivax* infections produced in mosquitoes when the gametocytes were "sub-microscopic". Finally, Manwell (1941) quotes 12 per cubic millimetre as the minimal infecting dose for *Plasmodium vivax* found by Darling and less than 12 per cubic millimetre found by Craig.

The position is complicated by the fact that "bad" infectors tend to predominate in the lower ranges of gametocyte numbers, and so we have chosen 40 per cubic

millimetre for *Plasmodium falciparum* and 10 per cubic millimetre for *Plasmodium vivax* as the best guesses that can be made at the lowest concentrations likely to infect mosquitoes in nature. Incidentally, only one of our crescent carriers had between 30 and 40 per cubic millimetre, and one *Plasmodium vivax* gametocyte carrier had between 10 and 24 per cubic millimetre, so that the precise level selected would in this instance have made little difference.

The use of these standards completely alters the epidemiological picture presented by the gametocyte rates, as may be seen from Graph VI, in which the critical levels are indicated by vertical broken lines down the page. The adults disappear from significance—a fact that we had long suspected, and one which has some bearing on policy in relation to native labour; even the children remain effective only for *Plasmodium vivax*, and the great mass of infective material is concentrated in the infants. Numerically, they are the least significant element in the community; but parasitologically they are by far the most important, and mosquitoes have ready access to them, for any protective measures available, such as nets or a good place close to a smudge fire, are reserved strictly for men.

It is to be emphasized that these findings apply only to this particular community; in more normal communities children will also be found to contribute significantly to transmission of *Plasmodium falciparum* as well as to that of *Plasmodium vivax*. We cannot speak of *Plasmodium malariae*, for too little is known about the behaviour of its gametocytes; but to judge by rates and total counts, the children, as elsewhere in New Guinea, would seem to be the chief reservoir of infection.

There is another community in which we were intensely interested—indeed, in relation to which the whole work was undertaken—namely, our own troops. What were their sources of infection? A glance at Graph VI and Table IV will show that the possible sources of infection, in order of parasitological importance, were as follows: for *Plasmodium falciparum*, native infants, Japanese, Australian troops; for *Plasmodium vivax*, native infants, Japanese, native children. Now the troops' contact with native children and infants on the coastal sector (though not in the ranges) was brief and slight, so slight that they could have acquired only a small proportion of their infections from them. On the other hand, contact with the Japanese was close, particularly in the forward units in which the incidence of clinical malaria was highest. So we would conclude that our troops acquired an overwhelming proportion of their infections in the coastal area from the Japanese—a fact which we had long suspected on general grounds, but for which we had previously been unable to collect concrete evidence. We feel that in the hills, too, the Japanese were probably the main source of infection, if only by reason of their numerical preponderance; but in any case the general proposition is unaffected, for conditions in that part of the campaign were unusual in New Guinea operations.

Further evidence that infections came to our troops from in front rather than from behind is shown in Table V. A combination of low infective gametocyte rates in the troops and of control, which was carried forward on the ground and by aircraft spraying with DDT at least as far as battery positions and battalion headquarters, resulted in low infection rates in the Anophelines, falling to zero as conditions became stabilized.<sup>2</sup>

An interesting corollary to this proposition is that, as the Japanese were mainly inland and above our people, the infected mosquitoes would come in, not on the dying evening breeze, but on the early morning off-shore and katabatic drift of air. The most dangerous period would be the pre-dawn stand-to, a time when men, heavy with

<sup>1</sup> It does not matter that these may later become adequate, or that "good" infectors may become "bad" infectors; what we are concerned with is the situation at a given moment of time, trusting that the moment is reasonably well chosen.

<sup>2</sup> These Japanese were examined immediately they came in from their positions after the surrender, so that there was no time for any change to occur in their parasitological picture. There is, incidentally, evidence (to be discussed elsewhere) that they had acquired an appreciable degree of immunity during their two years' experience of intensive malarial infections.

<sup>3</sup> Corroborative dissections were not practicable in the zone of contact with the enemy.

sleep and concentrating on possible movement in the jungle, would be least likely to attend efficiently to the details of personal protection. Thus we can add one more to the innumerable little practical difficulties which beset malaria prevention in military operations.

#### Summary.

1. The results of a malaria survey of a native community near Wewak, New Guinea, are described. The situation lay between Schüffner's grades of highly and moderately hyperendemic malaria, but was complicated by development of immunity at an unusually early age.

2. An examination of parasite counts shows what appears to be a distinction between infections suppressed by immunity at trophozoite counts below 40 per cubic millimetre and parasitologically overt infections with higher counts.

3. The Anopheline was *Anopheline punctulatus farauti* (*moluccensis*), the oocyst rate being 3.5% and the sporozoite rate 2%. Filarial larvae were also found in 3%.

4. The differences between total and effective gametocyte rates are discussed, and the effective gametocyte reservoir is shown to be restricted to the infants for *Plasmodium falciparum* and to the infants and children for *Plasmodium vivax*; children are the main reservoir of *Plasmodium malariae*.

5. Evidence is produced to show that the Japanese were the preponderant source of infection for the Australian troops.

#### Acknowledgements.

Our particular acknowledgement is due to Major I. C. Macdonald and Major J. I. Tonge, of Brigadier Fairley's field research team, for the use of the survey figures of the Australian troops, to Major Tonge for help with the parasite survey, and to Staff Sergeant McCredie for assistance with the dissections. Our thanks are due, too, to the Assistant Director of Medical Services of the Division, Colonel D. M. Salter, for cooperation in organizing the survey, and to the Director-General of Medical Services Australian Military Forces, Major-General S. R. Burston, for permission to publish.

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### PRIMARY CARCINOMA OF THE JEJUNUM, WITH THE REPORT OF A CASE WITH FOURTEEN MONTHS' SURVIVAL TO DATE.

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#### Incidence.

THE literature on malignant tumours of the small intestine clearly indicates that primary carcinoma of the jejunum is listed among the rarities in surgery. Small bowel carcinoma has a reported incidence ranging from 0.47% to 6% of all gastro-intestinal cancers. These studies are based on surgical specimens and autopsy material. Hence it is an infrequent experience for one surgeon to encounter many of these cases during his professional life.

J. Edgar Morrison<sup>(1)</sup> states that "for the area exposed, the small intestine enjoys as great an immunity from new growth as any part of the body". In the past ten years, at 2,434 autopsies he discovered one primary carcinoma of the jejunum.

Maurice Kahn and Max. W. Bay<sup>(2)</sup> (University of Southern California) report two cases from May, 1930, to 1941.

At the Lahey Clinic in thirty years twelve cases only have been recorded.

The youngest patient recorded is a girl, aged thirteen years.<sup>(3)</sup> In 55 cases of carcinoma of the small intestine collected from the Mayo Clinic by Rankin and Mayo in 1929, the average age of the patients was 47.5 years, the youngest patient being aged thirty-two years and the oldest sixty-nine years.

There is little variation in age as related to the region involved.

Charles W. Mayo<sup>(4)</sup> makes the following statement:

The jejunum is affected most frequently by neoplasms, especially the proximal quarter, although there is no apparent reason for this. The average length of the small intestine is about twenty-three feet; the duodenum measures ten inches, the first two-fifths of the intestine distal to this is considered by anatomists to be the jejunum and the terminal three-fifths the ileum, although the line of demarcation is indefinite. It is strange, however, that in the shortest and longest divisions, the frequency of neoplastic change is approximately the same. Another interesting observation is that the ratio of multiple to single lesions in the small intestine is about the same as in the large intestine.

The lesion occurs two and a half times as frequently in men as in women.

#### Pathological Findings.

##### Macroscopic.

Grossly, tumours of the small intestine in type are (i) annular constricting or (ii) asymmetrical. The annular constricting type is the commonest and is usually carcinoma. The asymmetrical type may be subdivided, according to the direction of the growth, into internal and external varieties. (a) The internal type of growth is usually benign and frequently grows toward the lumen of the intestine. Intussusception is a not rare complication and occurs especially if the growth is polypoid with malignant degeneration. This occurred in 23% of the tumours of the jejunum reported by Raiford<sup>(5)</sup> and in 30% of the cases reported by Stremmler (1924). (b) The

external type of growth is usually malignant and grows outward into the peritoneal cavity or the mesentery. This is the infiltrating and ulcerating type. The usual site is the proximal quarter of the jejunum (Maingot). Maingot states that metastases occur late in the internal type and early in the external type.

#### Microscopic.

The lesion is an adenocarcinoma in nearly all cases, but the scirrhous or the colloid varieties occasionally occur.

#### Metastasis.

Adenocarcinoma of the jejunum metastasizes early, and according to some authors spreads first to the mesenteric lymph nodes and peritoneum, then successively to the liver, lungs, long bones and *dura mater* of the spinal cord. Because of the rich absorptive field which the small intestine comprises, and because of its consequent abundant supply of blood and lymph vessels, metastasis unfortunately takes place early and beyond resectability.

#### Symptoms.

The symptoms vary in type and character. Factors influencing the clinical picture are (i) absence of obstruction (early symptoms), (ii) presence of obstruction (late symptoms occur with almost complete stenosis), (iii) the site of the lesion.

#### Symptoms Occurring before Obstruction.

The symptoms occurring before the onset of obstruction are the subtle symptoms which commonly accompany any intestinal malignant disease which produces very few subjective symptoms. The symptoms are as follows: (i) pain, which may be diffuse, shifting, dull and aching, or sharp and cramp-like; later the site of pain is the epigastrium; (ii) indigestion; (iii) eructations; (iv) nausea; (v) vomiting, with partial relief of symptoms; (vi) progressive anaemia causing increasing fatigue and weakness; (vii) constipation; (viii) loss of appetite; (ix) loss of weight; (x) distension and meteorism or feeling of fullness; (xi) a palpable tender mass, or if no mass, just tenderness; (xii) achlorhydria and the presence of occult blood in stools; these are mentioned in many articles as common findings, but they are not constant, and are clearly not specific in the diagnosis of cancer of the jejunum; tarry stools are not common.

#### Symptoms when Obstruction Occurs.

The jejunal lumen is rarely completely occluded by the neoplasm owing to the fluid nature of the bowel contents, although temporary or permanent obstruction may result when food particles are incarcerated in the area of new-growth. These obstructive symptoms may be divided into two groups: (i) those which accompany slowly progressive obstruction and (ii) those accompanying acute obstruction.

When obstruction in the upper part of the jejunum progresses slowly, then severe epigastric pain occurring in the greatest intensity two or three hours after meals is manifest. Vomiting occurs early, increasing in frequency and amount as obstruction progresses. Intermittent obstruction may occur with vomiting, colicky abdominal pain, distension and dehydration. The attack may subside after the passage of a few hours, only to recur at steadily shortening intervals.

With the onset of complete upper jejunal obstruction, the following is the symptomatology. The pain becomes sharp, spasmodic and agonizing to a degree. Vomiting is usually profuse, and the vomitus consists of large quantities of gastric, biliary and pancreatic secretions. Visible peristalsis may be present. The lower in the jejunum the lesion is situated, the more is distension noticed, and a ladder pattern centrally placed in the abdomen may be seen. Loss of fluids produces rapid dehydration, alkalosis and prostration. Perforation with peritonitis may occur.

Lower jejunal cancer usually reveals itself by obstructive signs which are slowly progressive, recurrent or acute in

type; when the lumen is occluded gradually, the symptomatology may be of several months' duration. The complaints may be of pain, nausea or vomiting, malaise, anorexia, and loss of weight and strength. Dehydration and prostration occur later than in the case of upper jejunal neoplasms. The symptoms may disappear, only to recur at more frequent intervals.

Many of these symptoms are common to various other conditions. Those most likely to lead to a correct diagnosis are epigastric distress, vomiting, asthenia, loss of weight, anaemia, and the presence of occult blood in the stools. The last is significant if the stomach and large intestine are exculpated.

Short episodes of intestinal obstruction may occur, increasing in frequency and severity as obstruction becomes more pronounced.

#### Diagnosis.

The diagnosis is generally made at operation or autopsy. There are few methods of determining the presence of a small bowel tumour. The most accurate method of detecting a jejunal lesion is by serial skiagrams taken every hour for six hours after a barium meal administered to the fasting patient. Dilatation of the stomach and small intestine, with retention of barium and delay in the passage of barium at a point of intestinal constriction, is the most suggestive finding; filling defects and craters are seldom revealed. A barium meal examination which shows a large six-hour residue in stomach and duodenum is suggestive. Usually when the neoplasm is easily demonstrable by X rays the lesion is inoperable.

Negative radiological findings in the small intestine do not rule out the diagnosis of jejunal carcinoma; only about 25% of primary carcinomata of the jejunum and ileum are visualized—the reason, of course, being that the contents of the small gut are liquid, and that considerable obstruction must exist before the films disclose the condition.

Other findings may be achlorhydria, which is usually found on analysis of the gastric contents, occult blood in the stools and a microcytic hypochromic anaemia.

#### Differential Diagnosis.

Conditions most likely to be confused with jejunal cancer are benign tumour, obstruction due to adhesions, spontaneous intussusception, volvulus, appendicitis, regional enteritis, and malignant disease of the caecum or ascending colon.

#### Prognosis.

With or without treatment, the prognosis is discouraging. The duration of life after resection of the lesion is one year (Kiefer and Lahey) to seventeen or eighteen months (Mayo and Nettrour<sup>(10)</sup>).

In Kiefer's series of eleven cases, only one patient was alive and well five years after the resection of a carcinoma of the proximal part of the jejunum. The resection rate is between 60% and 70% and the operative mortality rate between 30% and 40%. The prospect of a five-year cure following resection is not higher than 5%.

#### Treatment.

##### Pre-Operative Treatment.

These patients are debilitated and anæmic, or are in a state of chronic or acute intestinal obstruction. The pre-operative measures will therefore include blood transfusions for the anaemia, the intravenous administration of glucose and saline solution for the dehydration, and decompression of the proximal part of the intestine with an indwelling duodenal tube.

##### Operation.

The treatment is surgical always. The whole abdominal cavity must be thoroughly explored to eliminate the possibility that the jejunal tumour is not a secondary deposit from a primary neoplasm elsewhere.

Debilitated patients and those with severe obstruction should be subjected only to enterostomy at the first operation (Lahey). When resection is feasible, an attempt should be made to eradicate as widely as possible both



the tumour and its extensions to the adjacent lymph nodes. This is achieved by removing the tumour with a wide margin of healthy bowel both above and below it, and a large V-shaped portion of adjacent mesentery. The intestinal continuity is restored by performing an end-to-end or side-to-side anastomosis. The proximal section of the gut should always be at least six inches above the growth.

When extension of the lesion with metastases has occurred, a side-tracking lateral anastomosis around the obstruction will give symptomatic relief by forestalling or at least delaying obstruction of the bowel; for example, palliative duodeno-jejunostomy may be necessary for high lesions. Lahey has suggested the addition of a jejunostomy above the point of anastomosis in those cases in which primary resection and anastomosis are deemed advisable.

Carter<sup>(3)</sup> maintains that the surgeon should not be deterred from his purpose by the presence of enlarged nodes in the mesentery and retroperitoneum, and would advise resection in all cases in which this is feasible, as the swelling of the glands may be only inflammatory in character. Maingot<sup>(4)</sup> agrees with Carter that metastases occur late, especially in the internal type of growth.

When the carcinoma of the jejunum is situated six to twenty-four inches distal to the ligament of Treitz—and this is a common situation—one is left, after adequate resection of the neoplasm, with a small inadequate peritoneal stump of jejunum at the ligament of Treitz. Such a small stump of jejunum has too short a mesentery and intraperitoneal portion to permit safe end-to-end anastomosis. Even if this was possible, the anastomosis would retract retroperitoneally beneath the vascular mesenteric root, so that there would be a distinct possibility of obstruction from pressure, and a great danger of leakage with peritonitis. Maingot<sup>(4)</sup> states that in these cases it is best after resection to close both ends of the gut and to perform side-to-side duodeno-jejunostomy rather than to attempt what would in fact be a difficult, dangerous end-to-end anastomosis.

The steps of this operation are briefly as follows. After the affected segment of bowel has been resected and the proximal and distal ends of the cut intestine have been securely closed, the anterior leaf of the mesocolon is incised, and the third portion of the duodenum is mobilized; after this the distal portion of the jejunum is swung to the right in an anti-clockwise direction, so that it lies without any tension by the side of the duodenum. A side-to-side anastomosis is then carried out in the usual manner, and when this is completed the upper edge of the opening in the mesocolon is sutured to the duodenum anteriorly, and the cut edge of the mesentery of the distal part of the jejunum is stitched to the peritoneum of the posterior abdominal wall. Thus Maingot's procedure is a retrocolic lateral anastomosis between the jejunum and third part of the duodenum.

For these high lesions Lahey<sup>(5)</sup> suggests a new plan of antecolic duodeno-jejunal anastomosis to restore the continuity of the alimentary tract. After removal of the segment of high jejunum, both ends are inverted and reinforced with interrupted silk sutures. The parietal section of the peritoneum about the upper short stump of jejunum at the ligament of Treitz is then incised, and the stump is pushed beneath the vascular mesenteric root until it is on the opposite side of the mesentery. The incised ligament of Treitz is then closed and the entire right hepatic flexure of the colon is turned down by incising its outer leaf of peritoneum. This reveals the retroperitoneal section of the duodenum and the mobilized upper stump of duodenum. When this is done, the mesentery of the retroperitoneal part of the duodenum and jejunum is of sufficient length so that when the transverse colon is put back in place the mobilized duodenum and jejunum can be passed over and in front of the transverse colon, the lower stump of jejunum will be brought up in an antecolic position, and a safe lateral anastomosis can be accomplished between the antecolic mobilized segment of duodenum and the jejunum. With either of these two operative plans either lateral or

end-to-end anastomosis may be employed; but of the two, lateral anastomosis is preferred, because with it there is less even temporary high jejunal obstruction—a factor which, even though it be only temporary, can swing the balance in an unfavourable direction in these serious cases.

It is worthy of note also that either of these two operative procedures is particularly useful in dealing with gastro-jejunal ulcer and with gastro-jejuno-colic fistula.

X-ray therapy is ineffectual, and may even be dangerous because of the possibility of intestinal perforation due to necrosis of the neoplasm.

The operative mortality rate for any type of jejunal malignant growth is usually given as 20% at the Lahey Clinic and 30% at the Mayo Clinic. The mortality is highest the nearer the lesion is situated to the duodenum, and lowest when the lower part of the jejunum is thus affected. Resection was carried out in 42.4% of cases, palliative lateral anastomosis in 41.3% of cases and exploration only in 16.3% of cases.<sup>(6)</sup>

#### Report of a Case.

A male patient, aged fifty-eight years, a shift worker at a steelworks, was admitted to hospital on May 11, 1945. He gave a three-years history of what he called "attacks of wind on the stomach", which were relieved by anti-acid powders, of which he always carried a stock with him. Indigestion bearing no relation to meals was thought by the patient to be due to irregular hours of sleeping and eating, as the attacks were most severe whilst he was on night shift. His appetite was good, and he had had no vomiting, no abdominal pains, and no bowel irregularity during the attacks. No purgatives were ever necessary. He was steadily losing weight, having lost fourteen pounds in the last month. On May 10, 1945, the patient had first noticed that his abdomen above the navel was hard and bloated, and that he had wind associated with severe colicky pains above the navel; alkaline powders for the first time failed to produce relief with the belching of wind. Whilst drying his abdomen after bathing, he noticed a hard lump on the right side of his navel. The patient's aunt had died of carcinoma of the colon and his wife of pernicious anaemia.

On examination, the patient was an emaciated man showing evidence of loss of weight. A hard, mobile tumour, globular in shape and freely mobile, was palpated in the abdomen; it was certainly intraabdominal. The size of the tumour was two inches by two inches. Neither distension nor liver enlargement was present. The site of the tumour was two inches to the right and level with the umbilicus. Rectal examination revealed no abnormality. The urine was normal. The blood pressure was normal. In the chest evidence of chronic bronchitis was found. A barium meal examination on May 14, 1945, revealed no abnormality, and negative findings were also obtained on examination after a barium enema. A blood count revealed microcytic hypochromic anaemia. The stools contained occult blood. A test meal examination revealed achlorhydria. The Kline test produced no reaction. The provisional diagnosis of carcinoma of the ascending colon situated near the hepatic flexure was made.

At laparotomy on May 29, 1945, a hard tumour of the jejunum, two inches in diameter, was found, about twenty inches from the duodeno-jejunal flexure. The mesenteric glands were extensively involved; no preaortic glands were palpable. No secondary involvement of the liver was found. The other abdominal organs were palpated and found normal. An extensive wedge resection of thirty inches of small intestine was carried out, with closure of both ends of the small intestine and lateral anastomosis giving a three-inch stoma (Moynihan technique). The sutures used were one layer of silk and two layers of "0 and 0" chromicized gut. The anastomotic stoma was found to be three inches from the duodeno-jejunal junction.

After operation the patient was given a gastro-enterostomy diet. There was no stomach distension necessitating the use of Wangensteen suction. He did not vomit. A slight wound infection was present on the eighth post-operative day. The patient was discharged from hospital twenty-one days after operation.

A pathological examination of the tumour was made by Dr. Ethel Byrne.

Macroscopically, the specimen was a twenty-nine inch segment of the jejunum. The lesion was situated about the middle of the segment resected, and had a foul, ulcerating surface extending completely around the

circumference of the jejunum. The tumour was stony hard for about three-quarters of an inch on either side, with nodular irregular raised edges. The wall of the proximal part of the jejunum was distended above the growth, hypertrophied and somewhat stiffened with oedema. Microscopic examination showed the tumour to be an adenocarcinoma of the jejunum infiltrating beyond the muscularis mucosae. In the lymph glands hyperplasia only was found; there was no evidence of metastases.

The patient has been examined regularly for the last fourteen months. During this period he has steadily gained in weight, exceeding at present by sixteen pounds his average weight for the previous five years. No recurrence is palpable and his liver is normal in size. There is no occult blood in the stools. His only complaint is that he occasionally suffers from attacks of flatulence without distension after meals, this being immediately relieved by an alkaline mixture.

#### Summary.

1. Primary carcinoma of jejunum is a rare entity.
2. Affected subjects are usually males.
3. The maximum age incidence is in the group from fifty to sixty years.
4. Diagnosis is difficult, since the condition has an insidious onset.
5. Achlorhydria is usual (gastric carcinoma).
6. The lesions are often multiple.
7. The only effective treatment is surgical removal of the growth, which may be performed in one or two stages. The new surgical techniques of Maingot and Lahey are described.
8. The surgical mortality rate is 20% to 30%.
9. The prognosis is very unfavourable with or without treatment.
10. A case has been reported with a fourteen months survival up to date.

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## Reports of Cases.

### ABSENCE OF VAGINA AND UTERUS.

By H. A. RIDLER,  
Sydney.

CONGENITAL absence of the vagina and uterus is perhaps not a rare condition. I have now encountered at least twelve such cases. The patients have nearly all been young women, generally contemplating matrimony, and they have consulted me because they have never menstruated and have suddenly taken fright about the future. A lesser number have been young girls brought by their mothers for the reason that they have never menstruated. All these persons have been attractive and externally well developed in every way.

Some surgeons make for these unfortunates a vagina from a loop of bowel—a really difficult, dangerous and serious operation. Others now, so I understand, make these persons wear graduated cones pressing deeply into the part where the vagina ought to be, and eventually obtain some kind of a permanent depression to be used as a vagina.

In the past my advice to these people was not to marry; but the following case has shaken my belief that I did the right thing.

#### Clinical Record.

Some years ago a young woman, aged twenty years, was brought to me by her mother and also her fiancé, because she had never menstruated and they were about to be married. Examination revealed complete absence of vagina and uterus. The condition was explained to the three, and I advised against the marriage.

Four years later this young woman came to see me about a minor matter. She told me of her previous visit, and said that she had married then in spite of my advice. At my request she permitted me to make a "pelvic examination". She now had a depression where her vagina ought to have been, into which I could pass almost the entire length of my right forefinger. Her husband, who had accompanied her, said that this passage was entirely satisfactory to both of them, except that the patient had not become pregnant.

#### Comment.

Thus the oft-repeated efforts of her husband had made a vagina for her, far better than that made by the surgeon's knife or the instrument-maker's cold metal cones.

### THE STEVENS-JOHNSON SYNDROME.

By T. M. GILBERT,

Major, Australian Army Medical Corps,  
and

S. R. HING,

Captain, Australian Army Medical Corps.

THE Stevens-Johnson syndrome, which was first described by Stevens and Johnson,<sup>(1)</sup> may be more fully described as an eruptive fever with stomatitis and conjunctivitis; it has recently been the subject of comment in THE MEDICAL JOURNAL OF AUSTRALIA<sup>(2)</sup> following the publication of a report on two cases by Kove,<sup>(3)</sup> who discusses the condition in some detail.

The syndrome is clearly defined, fever, stomatitis and conjunctivitis being uniformly present. The eruption is a less consistent symptom. It has been absent in some reported cases, including the first of the two reported by Kove. In others it has assumed a vesicular form; but in the majority of cases the lesions have closely resembled those of *erythema multiforme*.

The march of symptoms also tends to vary. In the case described by Robinson<sup>(4)</sup> the eruption of macules did not appear until the ninth day. Stevens and Johnson describe this eruption as occurring on the third day. In an example mentioned by Ginandes<sup>(5)</sup> the eruption appeared at the onset and was followed by buccal and then conjunctival lesions—an order which has been reversed in our own case.

#### Ætiology.

There is still some doubt whether the condition is in fact a specific disease. Dermatologists tend to regard it as representing a variant of the bullous type of *erythema multiforme*, which is generally a much milder condition. Robinson evidently adheres to this view.

Attempts have been made, as in a case reported by Edgar and Syverton,<sup>(6)</sup> to cultivate a specific organism from unruptured vesicles. Although two rabbits died with pyrexia and pulmonary symptoms shortly after the injection of vesicle fluid, it proved impossible to produce passage to other rabbits with fresh organ suspensions,

and the post-mortem findings were attributed to anaphylaxis. Other rabbits were unaffected. In one of Edgar and Syverson's cases, that of a child, a second typical attack of the syndrome occurred six months after the first; this suggests that immunity is not so permanent as in the commoner exanthemata of virus origin. Several writers have recorded growth of the *Staphylococcus aureus* from lesions, but in these instances the possibility of secondary infection has not been eliminated.

Recently the association of *herpes simplex* with *erythema multiforme* has been the subject of comment by Anderson,<sup>(7)</sup> who found that recurrent attacks of this eruption could be controlled by the use of repeated injections of smallpox vaccine, which were already known to be effective against herpes, presumably because of some immunological relationship between the viruses. This might be counted in support of a virus aetiology for *erythema multiforme* and possibly for the Stevens-Johnson syndrome.

Known factors in the aetiology include age. According to Murphy<sup>(8)</sup> the disease occurs in children with rare exceptions. Our case must be listed among the exceptions. Ageloff<sup>(9)</sup> states that the majority of victims are of the male sex. Locality may play some part, for all the case reports seem to have come from the United States of America; but this may be because the syndrome has not been recognized elsewhere.

#### Course and Sequelae.

We have been unable to trace any deaths in the reports available; but most patients appear to have been seriously ill, with high fever. In our case the condition of the patient was so alarming as to make us think that death from bronchopneumonia would have been inevitable in the days before chemotherapy. As it was, the patient developed the signs of severe atypical pneumonia.

The course is variable, although the acute stage usually appears to last from two to three weeks. The restoration to normal of the mucous membranes may take much longer, and the ocular complications are sometimes persistent, as in the second case reported by Kove. Out of nine cases reviewed by Ginandes, in seven total loss of vision was sustained. This was in the days before the use of sulphonamides and penicillin. Kove's patient, despite these aids, still had moderate bilateral conjunctivitis and small synechiae on the eighty-sixth day.

Chemotherapy appears to act by preventing or controlling secondary infection. New lesions—for instance, the appearance of bullae on the conjunctivae, an interesting feature of our case, which was noted one day after the appearance of the skin eruption—are not prevented by it. Moreover, it did not prevent the occurrence of pneumonic lesions in this patient.

Special investigations do not appear to have yielded any useful information. Absence of leucocytosis and the presence of a normal differential leucocyte count seem to be the rule, except for a transient rise in the total number of leucocytes at the onset.

#### Clinical Record.

McG., aged forty years, a soldier, was admitted to hospital with the diagnosis of acute bilateral conjunctivitis. Three days previously he was perfectly well and had played several sets of tennis. The following day he developed a severe headache, which lasted nearly twenty-four hours and was accompanied by some giddiness. On awakening he found that his eyes were bloodshot and sore and that his throat was also slightly sore. He attended sick parade and drops were given for his eyes. The following day his eyes became worse and the soldier was dispatched to hospital, where he was admitted. Investigation of his previous history showed that he had had pleurisy in 1934 and mumps in 1937. No relevant family history was obtainable.

On examination the soldier looked ill and was very pale. His temperature was then only 100° F., his pulse rate was 80 per minute and the respirations numbered 20 per minute. He had acute bilateral conjunctivitis with some oedema of the eyelids. The whole of his mouth was acutely

inflamed and he was hardly able to open it for examination. The lips themselves were encrusted and tended to bleed, especially the upper lip. The whole of the mouth cavity, including palate, tongue and cheeks, was covered with large white bulliform eruptions, which had become more or less confluent, so that all his buccal mucosa and the upper part of his pharynx, with the exception of small areas on the tongue, appeared white. The bullae varied in size up to 1.5 centimetres in diameter. No skin lesions anywhere were present on the day of his admission to hospital. No other clinical abnormalities were apparent.

The patient was treated with penicillin, 15,000 units being given intramuscularly every three hours. Warm saline and hydrogen peroxide mouth washes were given every four hours. He was also given penicillin pastilles to suck every four hours, penicillin drops (2,500 units per millilitre strength) were instilled into his eyes every hour, and penicillin ointment also was used. He was given fluids freely, but was unable to take nourishment in any other form.

Culture of material from the first throat swab yielded a scanty growth of *Streptococcus hemolyticus* and a moderate growth of *Micrococcus catarrhalis*, but no other organisms. On the day after the patient's admission to hospital the leucocytes numbered 10,000 per cubic millimetre, 84% being neutrophile polymorphonuclear cells and 16% lymphocytes; no monocytes or eosinophile cells were present. The Kline test failed to produce a reaction.

On the third day erythematous maculo-papular lesions appeared on the patient's right knee, a few on the antero-medial border of his leg and one lesion on his right forearm. These *erythema multiforme* lesions varied in size up to about two centimetres in diameter. They were discrete and few in number in this case. There was no vesiculation or pustule formation in the skin lesions.

On the fourth day his eyes were still acutely inflamed, and in addition a mucopurulent discharge was present, whilst bullae were present in the conjunctiva in both eyes. His fluid balance was unsatisfactory at this stage and pyrexia was still present. The patient looked ill and was miserable.

By the fifth day many of the bullae had formed sloughs, leaving parts of the mucous surfaces raw and ulcerated and other parts covered with this white slough. The urine output was still unsatisfactory, and a moist cough developed, which produced some tenacious sputum. Chest examination revealed an impaired percussion note at the base of the right lung, with rhonchi and tubular breathing. A blood count at this stage gave the following information. The haemoglobin value was 90% and the erythrocytes numbered 5,000,000 per cubic millimetre; the leucocytes numbered 6,000 per cubic millimetre, 67% being neutrophile polymorphonuclear cells, 30% lymphocytes, and 3% monocytes. A mouth swab yielded no organisms on attempted culture. Blood taken when the exanthem was at its height was sterile after 144 hours' incubation.

On the seventh day the condition of the eyes had improved so much that there was no longer any purulent discharge. The penicillin drops were now instilled every two hours. The slough-like membrane in the mouth was separating more, leaving raw, bleeding and painful surfaces. The lips were dry, cracked and encrusted. No fresh skin lesions had developed—indeed, the existing lesions were beginning to fade. Pyrexia was still present, and X-ray examination of the chest confirmed the presence of pneumonitis, probably with some collapse. In view of the apparent lack of response to penicillin and in spite of the leucocyte count of 6,000 per cubic millimetre, on the eighth day a course of sulphamerazine was instituted. However, the fluid balance was now satisfactory, and a differential leucocyte count revealed a percentage of 67 in the polymorphonuclear series.

The conjunctivitis had been practically cleared up by the tenth day and the patient was having penicillin drops instilled twice a day and penicillin ointment applied at night only. The sloughing in his mouth had been almost completed, and while the chest signs had diminished, some pyrexia was still present.



On the eleventh day a blood examination gave the following information. The haemoglobin value was 82%; the leucocytes numbered 9,000 per cubic millimetre, 74% being neutrophile polymorphonuclear cells, 20% lymphocytes, 4% monocytes and 2% eosinophile cells.

By the thirteenth day the patient's temperature had settled down and the general improvement was pronounced. Only two patches were left on either side of the uvula, while the eyes had completely returned to normal. Sulphamerazine therapy was suspended after 42 grammes had been given, and the penicillin injections after he had received 1,425,000 units.

By the nineteenth day convalescence was progressing satisfactorily, although a check radiological examination of the chest on the twenty-first day revealed that, while the lung lesion was resolving, some pneumonitis was still present.

On the twenty-third day a full blood count gave the following information. The haemoglobin value was 109% and the erythrocytes numbered 6,000,000 per cubic millimetre; the leucocytes numbered 8,000 per cubic millimetre, 60% being neutrophile polymorphonuclear cells, 30% lymphocytes, 6% eosinophile cells and 4% monocytes. The exanthem by now had faded considerably, although the lesions were still just recognizable. The stomatitis and conjunctivitis had completely cleared.

Convalescence was thus slow but uneventful, and the patient was discharged from hospital, perfectly well, after a severe illness lasting in all a little over five weeks.

#### Comment.

Our case had characteristic features, the purulent conjunctivitis and the bullous mouth lesions followed by the presence of a whitish pseudomembrane being outstanding. The skin lesions were sparse, but their bluish-red colour, their well-defined, slightly raised appearance and their variability in size made obvious the diagnosis of *erythema multiforme*. The eruption faded gradually to brownish, flat macules, which slowly disappeared.

Allusion has already been made to the presence of bullae on the conjunctiva and to the occurrence of pulmonary signs, which, to judge by the absence of references to them, are unusual.

#### Acknowledgements.

We wish to thank Captain V. M. Putland and Major E. J. Green for suggestions regarding treatment of the ocular and oral lesions respectively. We also desire to thank the Director-General of Medical Services for permission to publish this report.

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## Reviews.

### FRACTURES.

THE second edition of "A Complete Outline of Fractures Including Fractures of the Skull", by J. Grant Bonnin, now published, is an improved and extended work, which not only covers in good measure the proclaimed ambit of the work by the author, but will be welcomed in a broader group, including those with special interest in fractures, traumatic surgery and orthopaedics.<sup>1</sup> There is in the work much of interest and value on modern practice, based upon the author's experience and fortified by adequate reference and bibliography.

A broad survey is offered of standard available methods and the student is not left in doubt in the final decisive opinions clearly expressed.

The surgery of fractures is fully discussed, with acceptance of an increasing role for this method of fracture treatment, with appreciation of the lessened surgical risk with present chemotherapy, and the use of fixation materials of alloys of the same electrical potential as bone and without toxic effect. The British Medical Association report on the operative treatment of fractures is also set out.

There is some discussion on function in relation to the alignment obtained in fracture work. Some future work may more fully cover this latter field, for there is no aspect of fracture work upon which consultant advice is more frequently sought, not only by the student and graduate, but by the older practitioner.

It is not to be expected that difference of opinion will cease to exist in fracture work, but it is doubtful whether general approval will be given to the advice of acceptance of the disability of periarthritides at the shoulder in the aged patient. Not only does pain here often become intolerable in such patients, but the measure of response to orthopaedic treatment, by manipulation in appropriate cases, splinting and physical therapy, in addition to constitutional therapy, makes treatment worth while in a large proportion of cases.

One would not expect the blemish of "Osteochondritis Dessicans" to appear in a second edition, not in the text but in the index.

The term extension is commonly used in the lay world as synonymous with traction, but in surgical literature the term is better reserved to its anatomical sense in contradistinction to flexion. The term traction would then be used exclusively for pull in fracture work.

The work is a substantial advance upon the first edition and will be widely welcomed.

### GROWING OLD FROM THE MEDICAL ASPECT.

THE author of "Medical Aspects of Growing Old"<sup>2</sup> sets out, as his preface explains, to help medical practitioners to treat the aged, to help the aged enjoy a fruitful life, and to help those not yet in later life to avoid errors which may lead to pitfalls later on.

The product of this generous ambition falls rather short of the author's objective. Rarely, except in the cases of some questionable diets—the "low fat"—and some annotated exercises, are practitioners given any assistance, and they will find many of the physiological explanations of bodily phenomena in these pages not in accordance with accepted rules. Elderly people may be interested in the expressed philosophy of a trained observer; but the retired labourer will not always be happy reading in his community centre, nor the retired clerk digging in his vegetable garden. And most in the heyday of busy middle age will be so satisfied with their Calories, their exercise, their bowel habits, and their prospects of longevity, that they will not seek restrictions on the one hand minus the assurance of protraction on the other.

The author writes: "I tell my patients that when sleep is poor, they need more than they can get from the day's food and so have to take some concentrate of it from a bottle." It therefore ill becomes him to write of psychotherapy as blarney.

<sup>1</sup> "A Complete Outline of Fractures Including Fractures of the Skull", by J. Grant Bonnin, M.B., B.S. (Melbourne), F.R.C.S. (England); Second Edition; 1946. London: William Heinemann (Medical Books) Limited. 9½" x 5½", pp. 672, with many illustrations. Price: 30s. net.

<sup>2</sup> "Medical Aspects of Growing Old", by A. T. Todd, M.B. (Edinburgh), M.R.C.P. (London); 1946. Bristol: John Wright and Sons Limited. London: Simpkin Marshall (1941) Limited. 8½" x 5½", pp. 72. Price: 15s.

## The Medical Journal of Australia

SATURDAY, NOVEMBER 30, 1946.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

### THE FAMILY DOCTOR.

AT the present time the plaint is heard on all sides that there are not enough specialists in medicine. The dearth is not peculiar to Australia, but is reported also from Great Britain. The phenomenon is no doubt one of the results of the war, though it must be remembered that specialism in medicine has grown enormously in the last few decades and the demand for specialists has not grown less during the last six years. In an article on general practice in the Education Number of this journal published in 1929 the late A. Maitland Gledden described the state of affairs in Sydney just before the dawn of the present century, that is, slightly less than fifty years ago. He named about a dozen men who were practising as specialists. Nowadays the major and the minor specialties are so numerous that the average practitioner would probably find some difficulty in compiling a complete list of them. In spite of this growth of specialism, the need for skilled general practitioners was never greater than it is. It has long been said that the day of the general practitioner is done. It was said in Osler's day, and we read that in a lecture delivered to the Canadian Medical Association at Montreal in 1902 he said that it was amusing to read and hear of the passing of the family physician.<sup>1</sup> "There was never", he said, "a time in our history in which he was so much in evidence, in which he was so prosperous, in which his prospects were so good or his power in the community so potent." Whether the general practitioner of today is as prosperous in terms of money and other possessions as was the practitioner of Osler's day really does not matter. He still has prospects in the sphere of useful and interesting work that are just as good as they used to be, and on that account his power in the community is just as great. All who follow the profession of medicine recognize the fact that experience in general practice is the most secure foundation on which to build

a medical career. Other things being equal, success in the practice of a specialty is more likely to come to one who has been a general practitioner than to one who has not. To be engaged in general practice is a privilege and, like all privileges, it has continually to be won, continually to be deserved. To become complacent about the fact, to lose a sense of appreciation of the privilege, is to deteriorate. While this may not be of grave concern to the slipping individual, though any personal deterioration is to be deplored, it is a loss to the community as a whole. The community has need of all persons with power to help it.

General practitioners in America have banded themselves together in a Section on General Practice of Medicine of the American Medical Association. They have held their first meeting under the auspices of the association, with its blessing and recognition.<sup>1</sup> E. A. Royston made some remarks at the meeting which must be interpreted as indicating future activity of the section in the sphere of medical politics. This is perfectly natural and perfectly understandable; the event will appeal to general practitioners in the Commonwealth of Australia and they will wish their general practitioner colleagues in America every success. At the same time we note that at their initial meeting the Americans listened to an address from their chairman which shows that they met in an atmosphere calculated to prevent any complacency about their privilege to practise medicine. The chairman, W. M. Johnson, pointed out that 85% of the ailments for which people consulted doctors could be cared for by a competent general practitioner. He commented on the folly of subjecting a patient to a battery of expensive tests and laboratory investigations when human understanding and sympathy with the exhibition of a simple drug would effect a cure. Johnson pointed out that in the period of pseudo-prosperity through which the country was passing people were seeking the advice of specialists when specialist advice was not needed. In the opinion of many the same kind of thing is happening in this country. Strictly speaking, there should be no objection to this, provided that the patients are receiving simple and straightforward treatment suitable to their ailments—freedom of choice of doctor must be allowed. What does matter is that the flight to specialism, if we may call it so, shall not be carried to such lengths that the family doctor will despair of his own survival and of that of others of his kind. Johnson has something to say about what the family doctor should do to ensure his survival. The first injunction that he gives is to improve the quality of general practice. Osler said much the same kind of thing when he spoke of the possible failure of a general practitioner to realize first the need of a lifelong progressive personal training, and secondly, the danger lest in the stress of practice he should sacrifice that most precious of all possessions, his mental independence. Johnson quotes S. A. and S. B. Thompson as having mentioned two criticisms most frequently offered about general practitioners. The first is the failure of the general practitioner on occasion to differentiate between the trivial and the serious, and secondly his failure to observe the limitations of his training. Johnson thinks that there may be some basis for these criticisms—because he is pressed for time

<sup>1</sup> "Æquanimitas", Second Edition, 1906, page 296.

<sup>1</sup> The Journal of the American Medical Association, September 7, 1946.

the practitioner may overlook a diagnosis or because of mistaken kindness he may, in consideration of the cost to the patient, neglect to have an important test carried out. This is, of course, true and only goes to show that constant care and watchfulness are needed. Johnson thinks that the second criticism may be averted if more men aspire to become family doctors rather than general practitioners. The distinction that he would make needs no explanation to practitioners of medicine. We shall all agree that practitioners will not "lose face" with their families if they are not willing to treat all the ailments from which members of the family suffer. Of course circumstances may arise, particularly in more or less isolated country districts, when a practitioner may be compelled to attempt work in which he has had but little experience; but this will not often happen. The ideal of the family doctor is one that should be cherished; incidentally it is one of the most gratifying roles that a man can be called upon to play. The family doctor is not to be absolved from what Osler described as a lifelong progressive training. He needs to study by reading and by discussion with other practitioners in just the same way as any other practitioner. Doubt has been expressed whether in conditions of group practice the role of family doctor will still be possible. There seems to be no reason why not. In the matter of who shall attend them in illness and who shall help them in the diverse problems of the mind that arise from time to time, men and women can be and often are most determined. The best way in which the general practitioner can make sure of his "survival" is to make his practice of such a high quality that he will be regarded as indispensable.

The second way in which Johnson thinks that the survival of family doctors may be assured is by increasing their number. Though in some ways an overcrowded profession may be a source of danger, additions to the ranks of general practitioners will be needed until every family in every type of centre has ready access to a competent practitioner who lives close at hand.

This short discussion was opened by reference to specialists. Specialism is often set up as something much to be desired, and men and women in medicine go to no end of trouble to acquire the tag of specialist. If the honest truth is told, there is no specialist of such inherent worth as the family doctor of traditional type.

### Current Comment.

#### A VIRUS ORIGIN OF RECURRENT PEPTIC AND DUODENAL ULCERS.

THAT recurrent peptic and duodenal ulcers are due to a virus is the hypothesis advanced by Dr. Loforte Gonçalves, professor of pharmacology in Porto Alegre, Brazil, in an interesting article published in the *Revista de Medicina do Rio Grande do Sul*.<sup>1</sup> The author reviews in considerable detail the suggested causes advanced by other writers, such as circulatory disturbance, both thrombotic and arterial spasm, hyperacidity, trauma, over-indulgence in tobacco, hereditary disposition, loss of mucin coat, hyperperistalsis, pyloric spasm, undue gastric distension, allergy,

endocrine disturbance particularly of pituitary origin, and, amongst several others, the purely psychogenic origin. Loforte Gonçalves does not discredit the roles which these can play; he rather accepts their validity, but regards them as antecedent to an infection by a virus which in many respects resembles the virus responsible for infective herpes. The experimental procedures are given with considerable detail. Rabbits and rats were inoculated with extracts of ulcerous material obtained from surgical operations, also with saliva yielded by patients in whom peptic and duodenal ulcers had been diagnosed clinically and radiologically. The channels of inoculation were the anterior chamber of the eye and intracerebral, suboccipital, intramuscular and intravenous routes. Sources of possible error are given with commendable candour. The results of the experiments running to a few hundred are held to support the contention that a rather virulent virus was present in the ulcerous material and also in the saliva of the ulcer patients. In support of his view the author states that bile is known to destroy the herpes virus, and this accounts for the localization of the ulcers especially in the duodenum. He also contends that recurrent peptic and duodenal ulcers occur more frequently in persons who have had the gall-bladder removed or who are suffering from liver or bile duct disturbances. The article is certainly stimulating and will no doubt lead others to repeat the experiments in laboratories of pathology and internal medicine.

#### HYDATID DISEASE IN ICELAND.

ICELAND has been long known as a heavily endemic centre for echinococcal infestation. The war has again brought to notice the importance of locally endemic disease in all sorts of places scattered over the face of the earth. Fortunately for those whose duties took them to Iceland, an intense campaign of hygiene during recent years has reduced the incidence of hydatid disease in human beings to a low level. Niels Dungal has published an account of hydatid infestation in Iceland based on studies made in the department of pathology in the University of Iceland.<sup>1</sup> He states that reliable statistics are not available, but that an estimate of the infestation rate in the middle of the last century placed the figure at about one in seven of the population. These figures of Schleisner are considered by other authorities to be too high, and Finsen as the result of his personal experiences, allowing for the natural concentration of hospital figures, thought a more just estimate was one in every forty or fifty. Jonassen placed the figure for the whole country at one in sixty-two.

Dungal has based his own conclusions on autopsy figures. In the last fifteen years 1,231 autopsies were performed and these are made the basis for an analysis. The author points out that this should give a truer figure, as the morbidity statistics from the living count only those who were clinically inconvenienced and do not include those who achieved a natural cure of local and often unsuspected lesions. Some points of interest emerge regarding localization of cysts. By far the most common site was the liver, in which cysts were found in 56 out of 60 cases. Two were found in the spleen and two in the heart. No pulmonary cysts were encountered. Dungal doubts the figures of Jonassen, who found nine instances of renal hydatid in fifty cases; he thinks these could not all have been hydatid cysts. The commonest site in the liver was of course the right lobe, but the author found cysts in both lobes in some 12% of his series. This figure is much lower than that given by Dew in his book, and also the figures given by other writers, but Dungal thinks that the heavier degree of infestation accounts for this discrepancy. Among several cases of unusual interest the history is given of a patient who collapsed following the rupture of what was believed to be an ovarian cyst; it was really a huge hydatid cyst which had ruptured, holding sixteen litres of fluid. This would appear to be a record in point of size.

<sup>1</sup> *Revista de Medicina do Rio Grande do Sul*, Volume X, XI and XII, 1946.

<sup>1</sup> *The American Journal of the Medical Sciences*, July, 1946.



The most interesting part of this report is that dealing with the preventive aspect. The author considers that the distribution of patients over the island is fairly regular and that his figures are not unduly weighted with urban examples. He further thinks that the age distribution is reliable in that carriers of the echinococcus are not likely to be disproportionately spared. Consideration of his figures leads Dungal to believe that the population of Iceland was much more heavily infested in the latter part of last century than is generally thought. He is prepared to give the incidence as about one-third or even one-half of the population at this time. He points out that the age of healed hydatids can be surmised and thus the distribution of these in the bodies of old people will give some inkling of the frequency of the infestation when these people were young. He also describes the primitive conditions prevailing in those times. The people were sheep breeders, they lived in a state of non-existent hygiene, ignorance of the condition was universal, and dogs were treated as commensals. The infestation rate of dogs was given as 28% by one investigator in 1862, and a human population of 70,000 supported from 15,000 to 20,000 dogs. But today the picture is entirely different. The autopsy figures strongly suggest that the young generation is growing up practically free from hydatid disease. This happy result is, in the author's opinion, largely due to education; enlightenment begins in the schools and has been extended to the whole population. The slaughtering of sheep is carried out under proper conditions, and every dog in the country is given an anthelmintic each year. Further, few older sheep are slaughtered, few of those used for food being allowed to pass the lamb stage. In common with the populations of most countries, many of the former country folk now live in towns; one-third of the Icelanders live in Reykjavik. Iceland may be congratulated on a great advance in preventive medicine, even though part of the price paid is the doubtful advantage of urbanization.

#### FOLIC ACID.

TWENTY years ago the remissions of pernicious anaemia were an obscure phenomenon in the course of the disease, influenced by no therapeutic gesture of that day. Today remission is, happily, merely the expected event following the administration of liver substance or a potent extract. Despite many advances in knowledge and our available methods of treatment, no other substance has replaced the active hematopoietic principle of liver, or even been a serious rival. Now "folic acid" compels our interest, for not only can it effect remissions in pernicious anaemia, but as a synthetic accessory dietetic factor it indicates fresh extensive fields of fruitful research. It is curious that once again the practical use of a therapeutic weapon seems to have anticipated accurate knowledge of what it really is. But though the philosopher's prerequisite cannot yet be fulfilled, that we should understand what a thing is before we discuss it, we can profit greatly by exploring the action of this substance or group of related substances which belong to the still expanding family of the vitamin B complex.

L. J. Berry and T. D. Spies have published a comprehensive review on the present status of folic acid, in which they trace the history of the various researches that have led up to the present position.<sup>1</sup> They point out that the light that now seems to be clearing some of the obscurities has been derived from quite divergent sources. Inquiry into growth factors needed for the multiplication and maintenance of certain lactic acid bacteria has shown that extracts of plant and animal origin are essential. In addition to the previously known components of the vitamin complex another compound was found to be necessary for the proper growth of a test member of the *Lactobacillus casei* group, and in this were recognized certain chemical hallmarks. Later a very concentrated growth factor for *Streptococcus lactis* R was found in

spinach, a source which suggested the name "folic acid", and this was also effective for the *Lactobacillus casei*. Growth factors derived from different sources showed diversity in potency, hence the concept emerged of a group of folic acid substances, whose relationships were and still are obscure in spite of much analytical research. Meanwhile work was being done on an apparently unrelated subject, the factors necessary for the prevention and cure of macrocytic tropical anaemia, following up the findings of Wills and numbers of other investigators. Fractionation of yeast and other preparations established that there was a specific dietary supplement which protected monkeys from a fatal cytopenia of deficiency type. This was called "vitamin M". Day and his co-workers last year showed that a purified *Lactobacillus casei* growth factor was highly effective in curing monkeys suffering from a vitamin M deficiency. The story now turns to the nutrition of chicks, in which it was discovered that a new member of the vitamin B complex was not only essential for growth, but in order to save the birds from a severe macrocytic anaemia. The standard vitamins produced no alleviation of this latter condition, but it was cured by a liver concentrate apparently related to or identical with the *Lactobacillus casei* growth factor, and closely allied with the folic acid group. Finally, researches into the growth and nutrition of rats advanced knowledge a further stage. In studies of the relationship between the sulphonamides and vitamin deficiency it has been found that rats fed on purified diets with sulphaguanidine added suffered from severe lowering of bone marrow function which can be cured with a liver extract known to contain the *Lactobacillus casei* factor. Nutritional research on higher animals has further confirmed the importance of these factors in haematopoiesis, and with this inadequate sketch of the basic investigations which are fully set out by Berry and Spies in their article, we may pass to the results in man.

Though the issues are wider than those concerned in blood disorders, this is the aspect which interests us most at the moment, and in the field of macrocytic anaemias there seems to be promise of definite advance. The successful treatment of tropical macrocytic anaemia and sprue has long given us hope that similar methods might be applied to the treatment of other types, in particular Addisonian anaemia. The recent work with folic acid encourages us further in that hope. Such reports are those of Luis A. Amill and Myron Wright,<sup>1</sup> and J. F. Wilkinson, M. C. G. Israëls and F. Fletcher.<sup>2</sup> These articles deal with the treatment of unselected small series of cases of pernicious anaemia, the diagnosis being carefully confirmed by full investigation. Folic acid was given both by oral and intramuscular routes in various doses. The optimal dose has not been yet worked out, nor has any comparison with liver extracts been attempted. These authors obtained very encouraging results, but they are careful to point out that they are not able to say whether the modes of action of liver and folic acid are the same, whether they are equally effective, or whether folic acid can protect against the onset of the neural complications of this disease. Apparently the gastric achlorhydria remains unchanged. It appears that the *Lactobacillus casei* growth factor and the anti-anaemic factor of liver are probably not identical, as the latter contains only a small amount of folic acid. Only the future can tell exactly what "folic acid" is, what part it plays in nutrition, and to what extent it will be of importance in the treatment of the macrocytic anaemias.

Finally it should be pointed out that this vast mass of work from which valuable results are emerging is largely of a highly specialized and technical kind. Much of it is of the so-called "academic" order, a word which should be used in praise and not in reproach. Such investigations cannot be integrated or directed by any save those of scientific training and habit, and in the future control of research it is to be hoped that our legislators will recognize this.

<sup>1</sup> The Journal of the American Medical Association, August 10, 1946.

<sup>2</sup> The Lancet, August 3, 1946.

<sup>1</sup> Blood, July, 1946.

## Abstracts from Medical Literature.

### PHYSIOLOGY.

#### The Influence of a Placebo, Body Position and Medication on Motion Sickness.

D. B. TYLER (*The American Journal of Physiology*, June, 1946) reports the result of some sixty experiments involving more than 15,000 unselected young men on the influence of a placebo, of body position and of medication on motion sickness. There was no "placebo" effect. The incidence and the severity of sickness which developed in groups receiving a placebo and in untreated control groups were of the same order. This indicates that psychic factors are of minor importance in the causation of motion sickness as it occurs in a large unselected group of individuals. In landing craft the position of the body or of the head or of both is a potent factor in determining the incidence and severity of seasickness. Hyoscine alone or combined with hyoscyamine, atropine or certain barbiturates is a very effective medication for the prevention of seasickness.

#### Oxygen Consumption for Men of Various Sizes in the Simulated Piloting of an Aeroplane.

P. V. KARPOVICH AND R. R. KONKIN (*The American Journal of Physiology*, June, 1946) report results showing the effect of body size on oxygen consumption and lung ventilation during work similar to that done in piloting an aeroplane. Twenty-seven enlisted men varying in height from 60.5 to 75.2 inches and in weight from 120 to 220 pounds were used as the subjects. Testing was done on a special ergometer simulating the cockpit of an aeroplane. An increase in body size caused an increase in resting gross oxygen consumption at the rate of 0.135 litre per minute per square metre or body surface area. During work this rate rose to 0.266 litre per minute. An increase in body size caused an increase in resting lung ventilation at the rate of 3.2 litres per minute per square metre of body surface area. During work this rate rose to 4.4 litres per minute. Comparison between the largest and the smallest man eligible to be an army pilot shows that the former has at rest a lung ventilation rate 41.0% greater than the latter. During simulated flying this difference becomes 42.8%. The lung ventilation-oxygen consumption ratio was 23.7 at rest and 19.6 during work. There was no relationship between the body size and the mechanical efficiency of the arms and legs.

#### The Regulation of Arterial Blood Pressure.

J. P. HOLT, W. J. RASHKIND, R. BRUNSTEIN AND J. C. GREISEN (*The American Journal of Physiology*, June, 1946) report that they determined the arterial pressure, cardiac output, heart rate, plasma volume, "average circulation time" and hematocrit value in a barbitalized dog. The total peripheral resistance, blood volume, total red cell volume, stroke volume, and the volume of blood in the heart, lungs and large arteries were calculated in the control

state, after the opening of a large arterio-venous shunt, during stimulation of the carotid sinus nerve and the central end of the vagus nerve, after spinal cord section and following the injection of epinephrine and "Paredrine". As a result of opening the arterio-venous shunt the arterial pressure decreased 4%, cardiac output increased 40%, and total peripheral resistance decreased 28% on the average. As a result of stimulation of the carotid sinus nerve the arterial pressure decreased 47%, cardiac output decreased 7%, and the total peripheral resistance decreased 38% on the average. As a result of spinal cord section the arterial pressure decreased 47%, cardiac output decreased 19%, and the total peripheral resistance decreased 33% on the average. As a result of stimulation of the central end of the vagus nerve the arterial pressure increased 65%, cardiac output increased 13%, and the total peripheral resistance increased 56% on the average. The plasma volume, total red blood cell volume and blood volume were increased in every case following spinal cord section. A method for determining the "average circulation time" is described. It appears that the change in arterial pressure brought about by stimulation of the carotid sinus nerve or spinal cord section is caused to a large extent by a decrease in cardiac output and to a small extent by a decrease in total peripheral resistance. It is concluded that changes in arterial pressure brought about by these vasomotor influences are largely the result of changes in the tone of the smooth muscles of the veins (post-arteriolar blood vessels) which increases or decreases the cardiac output.

#### The Effects of Training on Pulse Rate, Blood Pressure and Endurance in Man.

R. C. COGSWELL, C. R. HENDERSON AND G. H. BERRYMAN (*The American Journal of Physiology*, June, 1946) report that in the course of conducting repeated tests for "physical efficiency" during a twelve-week period upon seven young men, aged twenty-three to twenty-eight years, who had volunteered for nutritional investigation, the following observations were made in relation to the data obtained with (a) the step test (Harvard); (b) the treadmill at 10% grade and six miles per hour, and (c) the bicycle ergometer adjusted to individual capacity. In submaximal exercise, post-exercise pulse rates showed a decrease with training, whereas maximal tests failed to produce a similar response. Systolic blood pressure, resting and post-exercise, tended to decrease with training on the step test. Diastolic pressure immediately following each step test run dropped significantly, but reached approximately the resting level by three minutes after the exercise. A downward trend in diastolic blood pressure one minute after the exercise was noted with step test training, whereas no trends were observed in two or three minute pressures, indicating more efficient reestablishment of a resting vascular state. Training rate appeared to be so affected by load that changes in load in either direction about an optimum decreased the rate. Men having higher than average resting pulse rates tended to have higher than average post-exercise pulse rates. Men having pulse rates higher than their

own average and higher than group average for a given time tended to have higher than average post-exercise pulse rates at that time. A parallel decrease in trends of group systolic and diastolic blood pressure and pulse rate one minute after moderately strenuous exercise was found with training. Deviations in pulse rates after maximal and submaximal tests followed such a pattern as would be predicted from the work of Henderson *et alii*. In healthy young subjects, a sound synchronous with pulse was heard over the brachial artery up to two minutes after exercise, tending to give a false impression of actual diastolic pressure unless the fourth phase of auscultatory sound is designated as representing the diastolic pressure.

#### Rate of Water Loss from the Skin of the Foot of Normal and Trench Foot Subjects.

G. E. BURCH, H. L. MYERS, R. R. PORTER AND N. SCHAEFFER (*The American Journal of Physiology*, June, 1946) state that a problem of considerable importance and interest in trench foot is concerned with the disturbances in sweating and water loss through the skin. It is important to know when the return of sweat function has occurred in order to evaluate more thoroughly the completeness of healing of trench foot. The authors report that they found no difference in the rates of water loss from the skin of the plantar and dorsal surfaces of the feet of normal subjects and patients with mild chronic trench foot. This indicates that the skin showed a normal functional state and ability to inhibit water loss by diffusion, and the sweat glands a normal functional ability to secrete sweat. Under comfortable environmental conditions, the plantar skin showed a greater rate of water loss than skin from the dorsum of the foot. A hot and humid atmosphere resulted in a much greater rate of sweating from the skin of the dorsal surface than from the plantar surface. Measurements of the rates of water loss from the skin of the foot cannot be employed to detect a return to normal of relatively mild chronic trench foot.

### BIOCHEMISTRY.

#### Penicillin.

W. McDERMOTT *et alii* (*The Journal of Clinical Investigation*, March, 1946) have studied the absorption, excretion and destruction of orally administered penicillin. Absorption of ingested penicillin occurs chiefly from the duodenum. The amount of absorption from the stomach is not established, but is probably small. Inactivation of penicillin as a result of the acidity of the gastric contents is conditioned by a number of variables, and on the whole is seldom great. Absorption of penicillin is rapid. The maximum concentrations are attained in the blood within thirty to sixty minutes of ingestion. The subsequent persistence of penicillin in the blood is a reflection of the height of the maximum concentration originally attained, and does not appear to be a result of continued absorption from the alimentary tract. Absorption of ingested penicillin is incomplete. Two-thirds or more of an orally administered dose are apparently

not absorbed. Once penicillin has passed through the small intestine, only insignificant amounts are absorbed. The penicillin in the intestine which is not absorbed is inactivated by the bacteria in the colon, or, if an excess is present, it is excreted in the faeces. The necessity for the use of larger amounts of penicillin by the oral than by the intramuscular route is primarily the result of incomplete absorption and cannot be explained satisfactorily on the basis of destruction by acid or bacterial action.

#### Plasma Phosphatase.

C. H. LI *et alii* (*The Journal of Biological Chemistry*, June, 1946) have determined the alkaline phosphatase content of the plasma of male rats at various ages (21 to 90 days). After hypophysectomy, the enzyme activity in the plasma of male rats forty days of age decreases with successive post-operative periods (four to fifteen days). A similar lowering of the plasma phosphatase values in female rats occurs after removal of the pituitary body. In normal and hypophysectomized male rats the administration of adrenocorticotrophic hormone in doses causing hypertrophy of the adrenals produced a significant decrease in the alkaline phosphatase level of the plasma.

#### Shock.

A. WINKLER *et alii* (*The Journal of Clinical Investigation*, March, 1946) have studied the role of colloid and of saline solution in the treatment of shock. In early salt-depletion shock replacement of the salt deficits by either 0.9% or 5% saline solution was followed by restoration of the plasma volume, the circulating plasma protein and the circulatory dynamics to normal limits. An identical degree of recovery, however, was observed following administration of small amounts of either serum or gelatin containing only sufficient salt to replace 11% to 36% of the initial deficits. Administration of small amounts either of colloid solutions with a low salt content or of 0.9% saline solution in amounts equivalent to only 17% to 43% of the initial deficit, failed to improve the circulatory status beyond the degree observed to occur spontaneously in untreated animals. Colloid-containing solutions can exert a beneficial effect on the circulation in salt-depletion shock clearly beyond that due to the sodium chloride which they contain. Optimal therapy of all forms of shock should include not only the replacement of salt deficits present, but also the administration of colloid-containing solutions.

#### Blood Sulphonamides.

R. H. SILBER and I. CLARK (*Archives of Biochemistry*, May, 1946) have shown that although sulphaquinoxaline was found to the extent of 90% in rat plasma, compared with 75% for sulphamerazine, a more significant factor involved in prolongation of blood concentrations of the drug was the delay in emptying time of the gastrointestinal tract. As much as 30% of an oral dose was found in the stomachs of fasting rats after twenty-four hours. N<sup>6</sup>-acetylsulphaquinoxaline and 6-amino-sulphaquinoxaline were found in plasma to the same degree as sulphaquinoxaline, but did not maintain therapeutically significant blood concentrations after oral or intravenous administration. Like sulphaquinoxaline,

3-hydroxysulphaquinoxaline was 90% bound in plasma, was excreted into the intestinal tract to a large extent and was slowly eliminated from the gut. However, it was poorly absorbed after oral administration, apparently owing to its low solubility. The concentration of sulphadiazine in the blood was maintained, as well as that of sulphaquinoxaline, when food was withheld after oral administration of the drug. This was a direct result of the decrease of faecal loss of the drug, with consequent retention of the drug in the intestinal tract. Absorption of sulphaquinoxaline, sulphamerazine and sulphadiazine from three sections of the gut was compared by determining the fraction of a dose remaining in ligated sections twenty-four hours after injection. All were absorbed, most from the small intestine and least from the stomach, with the large intestine intermediate in absorptive capacity. Sulphaquinoxaline (the least soluble) was the most slowly absorbed from all three sections. Excretion into the small intestine was approximately equal to urinary excretion. Excretion into the stomach was negligible, but significant amounts were found in the large intestine after intravenous dosage.

#### Carcinogenesis.

E. L. TATUM *et alii* (*The Journal of Biological Chemistry*, June, 1946) have followed the levels of biotin, choline, inositol, *p*-aminobenzoic acid and pyridoxine during methyl cholanthrene carcinogenesis. No significant changes in inositol, choline or *p*-aminobenzoic acid were observed. The pyridoxine content appeared to increase slightly after either methyl cholanthrene or benzene treatment. The biotin content was found to decrease after methyl cholanthrene treatment, reaching a level of 64% of normal after a single application of the carcinogen, and maintaining approximately the same level during repeated paintings over a period of sixty days.

#### Vitamin B Complex.

C. W. DENKO *et alii* (*Archives of Biochemistry*, May, 1946) have made determinations on seven normal young men, of the daily urinary and faecal excretion of *p*-aminobenzoic acid, biotin, folic acid, pantothenic acid, pyridoxine, thiamin, riboflavin and nicotinic acid. Dietary intake of the vitamins was also determined. Daily faecal excretion was larger than urinary excretion in all cases except pantothenic acid and pyridoxine. The total daily urinary and faecal output of *p*-aminobenzoic acid, biotin, folic acid and pantothenic acid exceeded dietary intake. Dietary intake of thiamin, riboflavin, pyridoxine and nicotinic acid exceeded the combined urinary and faecal output. However, the methods employed do not measure all the metabolites of pyridoxine and nicotinic acid.

#### Plasma Substitutes.

F. S. ROBSCHT-ROBBINS *et alii* (*The Journal of Experimental Medicine*, May, 1946) have studied human and animal globin in relation to the production of haemoglobin and plasma protein. Haemoglobin and globin alone, supplemented or modified in various ways, are seriously considered as plasma substitutes. Human globin given to doubly depleted (anemic and hypoproteinemic) dogs by vein contributes to the production of new haemoglobin and

plasma protein, but some toxicity and weight loss occur. Dog haemoglobin, given intraperitoneally, is better tolerated and somewhat more completely utilized with more blood proteins formed and less weight loss. Dog globin (tryptic digest) given by vein to anemic dogs is associated with a moderate production of new haemoglobin. Horse globin by mouth contributes to the formation of new haemoglobin in the standard anemic dog. Dog haemoglobin given intraperitoneally to protein-fasting, non-anemic dogs is well utilized to maintain nitrogen and weight balance. A *dl*-iso-leucine supplement fails to improve this utilization of haemoglobin for maintenance in the dog. A small supplement of *dl*-methionine greatly improves the utilization of dog haemoglobin for maintenance in the dog and further addition of iso-leucine is without effect.

#### Gelatin Injection.

A. LOWELL *et alii* (*The Journal of Clinical Investigation*, March, 1946) have compared the effects of high and low viscosity gelatins after their intravenous injection in man. The infusion of either high viscosity gelatin or low viscosity gelatin was generally well tolerated. High viscosity gelatin reached a higher initial serum concentration, was retained longer in the blood stream and was excreted more slowly in the urine than low viscosity gelatin. The fall in haemoglobin, hematocrit and serum protein values suggesting haemodilution was more pronounced after the intravenous administration of high viscosity gelatin. There was a marked rise in erythrocyte sedimentation rate with each preparation. This returned to control levels within twenty-four to forty-eight hours. A transient rise in venous pressure occurred frequently in the injected vein, whereas simultaneous measurements in the opposite arm showed a less marked rise or no rise at all. Thrombosis of the injected vein was a common sequel to the infusion of either preparation containing the preservative phenyl mercuric borate. When gelatin preparations without preservatives were tested, the incidence of thrombosis declined sharply. Tests pertaining to cardiac, hepatic and renal function showed no significant changes, except for a transient albuminuria seen in most cases and lasting about twenty-four hours.

#### Acetyl Choline.

C. TORDA and H. G. WOLFF (*Archives of Biochemistry*, June, 1946) have examined the effect of sixteen alkaloids on the synthesis of acetyl choline. All the alkaloids used decreased the acetyl choline synthesis in a concentration of three milligrammes per hundred milligrammes of frog brain. Epinephrine, cocaine, ephedrine and ergotamine, in lower concentrations, increased the acetyl choline synthesis by from 20% to 150%. Yohimbine and pilocarpine, in lower concentrations, did not modify acetyl choline synthesis. Veratrine, quinine, quindine, strychnine, amphetamine sulphate, morphine, codeine, cinchonine, colchicine, *d*-tubocurarine and atropine decreased the synthesis in lower concentrations. The specific stimulator and inhibitor effects on the nervous system and effector organs of some of the alkaloids used seem to be independent of their effect on the synthesis of acetyl choline.



## Bibliography of Scientific and Industrial Reports.<sup>1</sup>

### THE RESULTS OF WAR-TIME RESEARCH.

During the war a great deal of research was carried out under the auspices of the Allied Governments. It has been decided to release for general use a large proportion of the results of this research, together with information taken from former enemy countries as a form of reparations. With this end in view, the United States Department of Commerce, through its Publication Board, is making a weekly issue of abstracts of reports in the form of a "Bibliography of Scientific and Industrial Reports". This bibliography is now being received in Australia, and relevant extracts are reproduced hereunder.

Copies of the original reports may be obtained in two ways: (a) Microfilm or photostat copies may be purchased from the United States through the Council for Scientific and Industrial Research Information Service. Those desiring to avail themselves of this service should send the Australian equivalent of the net quoted United States price to the Council for Scientific and Industrial Research Information Service, 425, St. Kilda Road, Melbourne, S.C.2, and quote the PB number, author's name, and the subject of the abstract. All other charges will be borne by the Council for Scientific and Industrial Research. (b) The following reports may be obtained in approved cases without cost on making application to the Secondary Industries Division of the Ministry of Post-War Reconstruction, Wentworth House, 203, Collins Street, Melbourne, C.1. Copies of these are available for reference in public libraries.

Further information on subjects covered in the reports and kindred subjects may be obtained by approaching the Council for Scientific and Industrial Research Information Service, the Secondary Industries Division of the Ministry of Post-War Reconstruction, or the Munitions Supply Laboratories (Technical Information Section), Maribyrnong, Victoria.

HARTLEY, EUGENE L. AND JONES, DOROTHEA B. The selection of emotionally unstable personnel by battle noise equipment. (Applied Psychology Panel, N.D.R.C. Project N-113. Report 11. OSRI) Report 4684.) Off. Pub. Bd., Report, PB 12052. 1945. 33 pp. Price: Microfilm, 50c.; Photostat, \$3.00.

A series of studies was undertaken to evaluate the role of the battle noise equipment as a device for selecting emotionally unstable men. Experimental procedures were devised and data were collected utilizing the equipment out of doors and indoors, and indoors supplemented with moving pictures. At the conclusion of each presentation of noise the men were asked questions relating to their responses to the noise. The results, preliminary as they may be, suggest that the use of noise will not contribute significantly to present selection procedures. Tables present data.

HARTLEY, EUGENE L. Battle noise equipment, study of use in selecting emotionally unstable men when noise is accompanied by moving pictures: a preliminary report. (Applied Psychology Panel, N.D.R.C. Project N-113. Informal Memorandum 4.) Off. Pub. Bd., Report, PB 12056. 1944. 8 pp. Price: Microfilm, 50c.; Photostat, \$1.00.

The battle noise equipment adapted for indoor use and supplemented with moving pictures, to provide an experimental screening procedure. This screening procedure was used on 489 men transferred from the fleet, who were sent through the regular Navy neuropsychiatric screening procedure immediately after the experimental procedure. Analysis of the correspondence between the two procedures revealed considerable similarity in results, but with significant discrepancies. Further exploration of the battle noise screening is warranted. Summaries of Informal Memoranda 2 and 3 are appended.

HARTLEY, EUGENE L. Battle noise equipment and screening of fleet groups, preliminary tabulation. (Applied Psychology Panel, N.D.R.C. Project N-113. Informal Memorandum 2.) Off. Pub. Bd., Report, PB 12054. 2 pp. Price: Microfilm, 50c.; Photostat, \$1.00.

Four groups of sixty men each were studied to determine the use of the battle noise equipment in eliminating personnel who would be emotionally unstable under actual battle conditions. The battle noise procedure involved a fifteen-minute exposure to the noise of a combination of simulated attack on an aircraft carrier and a cruiser engagement. Of

the 231 men passed by the regular screening procedure at Newport, 20% showed a battle noise sensitivity which warrants further investigation.

HARTLEY, EUGENE L. Battle noise equipment and screening of recruit groups, preliminary tabulations. (Applied Psychology Panel, N.D.R.C. Project N-113. Informal Memorandum 3.) Off. Pub. Bd., Report, PB 12055. 1944. 2 pp. Price: Microfilm, 50c.; Photostat, \$1.00.

Studies were undertaken to determine the use of battle noise equipment in eliminating personnel who would be emotionally unstable under actual battle conditions. Of 216 men tested, 51 showed a battle noise reaction which warrants further investigation. The relation between the battle noise study and the regular screening procedure at the U.S. Naval Training Station, Newport, R.I., is shown in tabular form.

U.S. ARMY AIR FORCES TACTICAL CENTRE. ARCTIC, DESERT AND TROPIC BRANCH. Notes on tropical diseases for Air Force medical officers. Regional medical studies. General medical bulletin. Off. Pub. Bd., Report, PB 9579. 1943-1945. 285 pp. Price: Microfilm, \$3.00; Photostat, \$19.00.

Collection of 38 publications on medical subjects. Sixteen notes on tropical diseases for Air Force medical officers include studies of malaria, dengue, diarrhoeal diseases, fungous diseases of the skin, tropical ulcers and desert sores, filarial disease, mite-borne typhus, intestinal and other parasites, cholera, plague, relapsing fever, trypanosomiasis, leishmaniasis, and louse-borne and flea-borne typhus fever, improvised combat sanitation, and use of DDT in the Japanese theatre of war for control of adult and larval mosquito vectors. Studies of the above diseases include discussions of geographical distribution (including map), cause, transmission, symptoms, diagnosis, treatment and control. Eighteen regional medical studies include discussions of geography and climate, maintenance of health, medical conditions and a topographical map of the following regions: Assam and Burma; South China; Java and Sumatra; Malaya; French Indo-China; Solomon Islands and Bismarck Archipelago; New Guinea; Philippine Islands; Borneo; Celebes, Moluccas and Lesser Sunda Islands; Polynesia (South Pacific Islands); Taiwan and Hainan; Bonin and adjacent islands; Nansei Islands; coastal China; Japan; Manchuria and Korea. The four general medical bulletins are: medical conditions in arctic regions; treatment of injuries due to cold; medical aspects of survival; poisoning by snakes, plants and fish, and treatment. Report contains photograph, diagrams, tables and graphs.

CHASIS, HERBERT, et alii. Brooklyn chlorine accident: A technical and medical report. PB 15424. 1944. 131 pp. Price: Microfilm, \$1.50; Photostat, \$9.00.

The accidental leakage of liquid chlorine from a tank being transported by truck in Brooklyn, New York, on June 1, 1944, was investigated. This report is concerned with the circumstances responsible for the production of casualties, the medical aspects of chlorine intoxication as exemplified by a limited number of carefully studied patients, and the evaluation of medical treatment. It is not concerned with the cause of the leak or with fixing responsibility for the incident. Tables, map, photographs and graphs are included.

LOUCKS, ROGER B. Impairment in psychomotor performance with the type A-13 pressure demand oxygen system at 45,600 feet simulated altitude. (Army Air Forces, School of Aviation Medicine, Project 308, Report 1.) PB 15511. 1944. 6 pp. Price: Microfilm, 50c.; Photostat, \$1.00.

A group of fifty subjects was employed in an investigation of the amount of decrement in psychomotor performance at 45,600 feet simulated altitude during utilization of the type A-13 pressure demand oxygen system at eight inches of pressure. Table in appendix lists the changes which are found when psychomotor performance is measured under five experimental conditions.

SEHOLZ, ROY O. Procedures utilized by the Food and Drug Administration, Division of Pharmacology, in the study of the toxicity of insect repellents. (National Research Council, Insect Control Committee.) PB 11331. December, 1945. 4 pp. Price: Microfilm, 50c.; Photostat, \$1.00.

Procedures for experiments on animals for determining the following are described: acute toxicity, subacute toxicity, chronic toxicity, primary irritations, sensitization, blood changes, and pathology.

SEHOLZ, ROY O. A review of the available toxicity data on Rutgers 612. PB 11324. July, 1945. 10 pp. Price: Microfilm, 50c.; Photostat, \$1.00.

The toxic properties of Rutgers 612, 2-Ethyl-Hexanediol 1, 3 were studied by investigators of the Food and Drug Administration under the direction of Dr. Herbert O. Calvery. The data given in this review are, in the main, repeated in total from the reports of the Food and Drug Administration. The procedures of the experiments on

<sup>1</sup>Supplied by the Information Service of the Council for Scientific and Industrial Research.

animals are given and the following topics are discussed: acute toxicity, subacute toxicity, chronic toxicity, primary irritation, sensitization, blood changes, pathology, and chronic feeding experiments. Tables show acute toxicity by skin and oral, intravenous and subcutaneous administration. A brief account is given of two human experiments using three persons each.

SCHOLZ, ROY O. Toxicity data on indalone. PB 11328. January, 1946. 5 pp. Price: Microfilm, 50c.; Photostat, \$1.00.

The toxicity information reviewed in this report was gathered in its entirety from the reports of Dr. H. O. Calvery and his co-workers of the Food and Drug Administration. The report gives results of experiments with indalone on animals in tabular form, showing acute oral toxicity; acute toxicity on intact skin and abraded skin of indalone (and a mixture of 60% indalone and 40% alcohol), intravenous toxicity; and the toxicity of dibutyl oxalate, an impurity of indalone. Subacute and chronic toxicity, primary irritations, sensitization, blood and pathological changes are discussed. The report ends with a summary, conclusions, and a list of references.

SCHOLZ, ROY O. Toxicity data on mixtures of dimethyl phthalate R-612 and indalone. (National Research Council Insect Control Committee.) PB 11327. April, 1944. 6 pp. Price: Microfilm, 50c.; Photostat, \$1.00.

The toxicity data reviewed in this report were gathered from the reports of Dr. H. O. Calvery and his co-workers of the Food and Drug Administration. The results of experiments on animals with mixtures of the above-named substances are given. Included are results in tabular form of a ninety-day subacute toxicity experiment by topical application to the skin of rabbits, a *résumé* of data on acute oral toxicity of dimethyl phthalate indalone, 612, and on mixtures of these substances, also a table showing oral toxicity data on repellent 6-2-2. A list of references is appended.

U.S. ARMY AIR FORCES. ARCTIC, DESERT AND TROPIC BRANCH, MEDICAL SECTION. Reno-Ureteral Lithiasis in A.A.F. Personnel, Project No. M-38. PB 12373. September, 1945. 48 pp. Price: Microfilm, 50c.; Photostat, \$4.00.

It was determined by a statistical study of figures obtained from eighteen large A.A.F. regional hospitals located in various sections of the United States that reno-ureteral lithiasis is significantly higher in A.A.F. flying personnel than in non-flying personnel. Results of the study suggest that dehydration is an important factor in the etiology of the disease. Comparison of data in this report with reports from tropical areas indicates that in some parts of the tropics the incidence of reno-ureteral lithiasis exceeds the domestic rate. This report contains detailed tables and charts.

U.S. NATIONAL RESEARCH COUNCIL. INSECT CONTROL COMMITTEE. Repellency data on dimethyl phthalate. PB 11325. February, 1945. 2 pp. Price: Microfilm, 50c.; Photostat, \$1.00.

This report consists of two tables giving results of tests of repellency of dimethyl phthalate using two types of mosquitoes, *Aedes aegypti* and *Anopheles quadrimaculatus*. The first table gives the number of tests with both types of mosquitoes, the range of repellency in minutes, and the average range for each. The second table shows the repellent effectiveness against *Aedes aegypti* in tests on sweating skin and dry skin.

WHITTENBERGER, JAMES L. The effect of tropical heat and humidity on the gas mask and the tolerance of man to the gas mask under such conditions. (Chemical Warfare Service, Medical Research Laboratory. MRL (EA) Report 30.) PB 2558. 1944. 13 pp. Price: Microfilm, 50c.; Photostat, \$1.00.

A study of the effect of use under tropical heat and humidity on the resistance, moisture content, and smoke penetration of gas mask canisters and the factors affecting the tolerance of men to the gas mask under these conditions. No significant change in resistance or smoke penetration of the canisters was found; weight gain of the canisters occurred. Resistance to breathing was the most important physiological factor affecting gas mask tolerance. Physiological factors appeared to overshadow all others affecting the tolerance of men to gas masks. Tables and graphs.

PB 11332. ARMSBEE, RICHARD A. A review of the physiological and toxicological action of alpha naphthylthiourea. (N.R.C. Insect Control Comm. Coordination Centre Rev. 1.) December, 1944. 12 pp. Price: Microfilm, 50c.; Photostat, \$1.00.

Alpha naphthylthiourea (ANTU) as a rodenticide was discovered by Dr. Curt P. Richter in the course of an extensive study of the toxic effect of a large series of substituted thioureas. The Wildlife Research Laboratory of the Fish and Wildlife Service has been the chief additional contributor. This review covers the Richter data through the November 7, 1944, report and the Wildlife Laboratory data, through the September, 1944, report.

PB 11337. ARMSBEE, RICHARD A. The mechanism of action of DDT. (N.R.C. Insect Control Comm. Coordination Centre Rev.

6. Report 149.) 1945. 21 pp. Price: Microfilm, 50c.; Photostat, \$2.00.

This is a review of the current information on the mechanism of the action of DDT in warm-blooded animals including man and in invertebrates with special emphasis on insects and crustaceans. Topics discussed are the mechanism of action in mammals, including neurological manifestations, biochemical and pharmacological findings, and toxicology; therapy; pathology; mechanism of action in insects and other arthropods; and general theories of the toxic action of DDT. A bibliography with 65 items is included.

PB 15422. CHANIS, HERBERT, *et alii*. Pressure breathing: Effects on respiration and circulation in patients with pulmonary edema of cardiac origin, with bronchial asthma or with acute and chronic pulmonary disease, considered in relation to the therapy of phosgene intoxication. (CWS. Medical Division. Contract W-49-636-ews-1.) March, 1944. 101 pp. Price: Microfilm, \$1.50; Photostat, \$7.00.

Quantitative observations of pressure breathing were made on respiratory and cardiodynamic functions, and the effects on respiratory effort and pulmonary adventitious sounds were studied. A brief diagnosis is given for each patient. Several types of apparatus for applying pressure at the mouth have been examined. Charts, diagrams and tables are included, as well as forty-three references. This is a final report under contract with New York University.

PB 11330. ARMSBEE, RICHARD. The toxicity of dibutyl phthalate to laboratory animals. 1945. 2 pp. Price: Microfilm, 50c.; Photostat, \$1.00.

This is a brief description of experiments to determine the toxicity of dibutyl phthalate (DBP). The report was received from the Insect Control Commission of the National Research Council.

PB 11329. SCHOLZ, ROY O. Toxicity data on dimethyl phthalate. January, 1946. 5 pp. Price: Microfilm, 50c.; Photostat, \$1.00.

The toxicity information reviewed herein was gathered in its entirety from the reports of Dr. H. O. Calvery and his co-workers of the Food and Drug Administration. The results of experiments with dimethyl phthalate on animals are given in tabular form, showing acute oral toxicity, acute intact skin toxicity, and pathological changes, and pathological lesions in rabbits inunited with dimethyl phthalate. Chronic toxicity, primary irritations, sensitization and blood changes are discussed. On the basis of the results obtained, dimethyl phthalate appears to be a relatively safe compound for use as an insect repellent. A list of references is included.

PB 11326. SCHOLZ, ROY O. Toxicity data on Lethane. 1946. 10 pp. Price: Microfilm, 50c.; Photostat, \$1.00.

The information on toxicity reviewed in this report was gathered entirely from the reports of Dr. H. O. Calvery and his co-workers of the Food and Drug Administration. Lethane is a trade name for n-octyl, n-decyl, n-dodecyl, n-tetradecyl, n-hexadecyl and n-octadecyl thiocyanates. The results of experiments on animals with these lethanes or thiocyanates are given, showing acute toxicity when applied to the skin and acute oral toxicity. Results of experiments showing subacute toxicity are also given. This report was received from the Insect Control Commission of the National Research Council.

PB 18325. ADAMS, J. K., *et alii*. The influence of the visual tasks required of personnel in the sixteen weeks fire controlmen (O) training course upon their visual proficiency. (Applied Psychology Panel: Selection and training of rangefinder and radar operators. Report 7.) (N.D.R.C. Applied Psychology Panel Report 271. OSRD Report 3970.) August, 1944. 29 pp. Price: Microfilm, 50c.; Photostat, \$2.00.

An investigation was made to discover if the work with optical instruments and with oscilloscopes had an injurious effect upon visual functions. The testing was done at the Naval Training Schools, Fort Lauderdale, Florida, with a group which spent a large number of hours of practice on stereoscopic trainers and rangefinders, on tracking telescopes, and on radar oscilloscopes in the course of their sixteen weeks' course of training as fire controlmen. Measures of visual acuity (far and near vision), vertical phoria, lateral phoria, stereopsis, and colour vision were obtained with the Bausch and Lomb ortho-rater and an additional measure of stereopsis was obtained with the multiple projection elkonometer (stereo vertical test). These measures were obtained at the beginning and again at the end of the sixteen weeks' course. It was found that: (i) there is no deterioration of any of the above visual functions as a result of this training; (ii) there is a slight improvement in visual acuity scores for right eye and for worse eye; (iii) there is an improvement in stereopsis score on both the elkonometer, stereo vertical, and the ortho-rater; (iv) there is an improvement in colour vision score on the ortho-rater.

## British Medical Association News.

### SCIENTIFIC.

A MEETING of the New South Wales Branch of the British Medical Association was held on May 23, 1946, at the Royal Prince Alfred Hospital. The meeting took the form of a series of clinical demonstrations by members of the honorary medical staff of the hospital. Part of this report appeared in the issue of November 16, 1946.

#### Osteomyelitis of Lumbar Vertebrae.

Dr. L. J. WOODLAND's first patient was a male, aged sixty-eight years, who gave a history of mid-lumbar pain, which had commenced suddenly three months earlier on February 4, 1946. He had vomited once when the pain commenced and felt feverish. The pain, which did not radiate, was relieved by lying down. He remained in bed because the pain recurred if he moved his lumbar region. For two years he had suffered from dysuria and frequency of micturition. These symptoms were unrelieved by suprapubic prostatectomy performed in Shanghai in January, 1945. On January 24, 1946, a stricture of the urethra was dilated.

Because of his urinary symptoms the patient was admitted to hospital under the care of Dr. J. S. Laidley on February 21, 1946, three weeks after the onset of symptoms. On his admission to hospital his temperature was 102° F., and for the succeeding three weeks he had a "sawing" temperature varying from 97° to 102° F. He was in no distress, except that when either active or passive movements of the lumbar part of the spine were attempted he complained of lumbar pain. He complained of tenderness all over both lumbar sacrospinalis muscles. His nervous system was normal. Investigation of the urine revealed a few pus cells, and culture produced a heavy growth of *Bacillus coli communis* and a moderate growth of non-haemolytic streptococci. A blood count showed the leucocytes to number 13,200 per cubic millimetre, 87% being neutrophile cells. It was considered that the patient's present trouble was not in the urinary tract. The cerebro-spinal fluid was normal. Agglutination tests for typhoid and paratyphoid fever and for typhus gave negative results.

On examination of X-ray films taken on February 26, a small cavity was seen on the anterior margin of the superior surface of the fourth lumbar vertebra. The films were not satisfactory because of gas in the bowel. Subsequent films taken on March 22 revealed destruction of the superior margin of the fourth lumbar vertebra with slight narrowing of the intervertebral space between the third and fourth lumbar vertebrae, and even at this date there was evidence of faint reactive new bone formation. Dr. Woodland said that subsequent films had revealed moderate destruction of the adjacent margins of the third and fourth lumbar vertebrae. There was no evidence of abscess formation.

Dr. Woodland pointed out that the differential diagnosis of pyogenic osteomyelitis of the spine was often difficult. Location of the lesion was aided by recognition of four clinical syndromes: the hip joint syndrome, the abdominal syndrome, the meningeal syndrome and the back-pain syndrome. The case under discussion illustrated the subacute type of the back-pain syndrome of osteomyelitis of the spine. Once the lesion was localized, it was then necessary to determine its nature. With regard to the diagnosis of spondylitis due to Malta fever, typhoid fever, mumps *et cetera*, it was necessary to rely mainly on the clinical history, agglutination tests, skin tests and blood findings, as there were no characteristic X-ray findings. However, the most frequent diagnostic problem was to differentiate between pyogenic and tuberculous spondylitis. In both conditions during the early stages X-ray examination revealed progressive thinning of the intervertebral space, decalcification of the affected body, and in some instances a focus situated just below the cartilage plate. But the progress of the two diseases was different. In pyogenic spondylitis, reactive new bone formation could be recognized in one to three months after the onset of symptoms; in tuberculous spondylitis this rarely occurred at any stage. Sclerosis around the primary focus occurred early in pyogenic infection.

Dr. Woodland went on to say that pyogenic osteomyelitis of a vertebral body usually commenced as a small, circumscribed area of destruction situated close to the cartilaginous plate. The lesion might remain localized, and be associated with slight narrowing of the intervertebral disk and accompanied by some atrophy of the bony tissue surrounding the focus of infection. Within a few months some sclerosis

appeared around the initial focus; in some cases slight reactive new bone formation was visible early, and usually complete healing occurred in nine to twelve months. In the patient presented the initial focus had soon spread to involve the whole of the intervertebral space and contiguous surfaces of the third and fourth lumbar vertebrae. As early as six and a half weeks after the onset of symptoms there was evidence of some sclerosis and also slight reactive new bone formation. The patient had been treated by rest on a Bradford frame. He was given a course of sulphadiazine in the earlier stage of his infection, without evidence of any benefit. Since complete rest for the lumbar part of his spine was instituted, he had been afebrile, looked well and had been free from pain. In spite of the early onset of reactive bone formation, the destructive changes were still progressing slightly. Usually the prognosis in cases of pyogenic spondylitis was good; but for a man of the patient's age the prognosis was guarded. Apart from the bladder infection there was no evidence of any other infective focus from which the pyogenic spondylitis might have arisen.

#### Lumbar Spondylolisthesis with Nerve Root Damage.

Dr. Woodland's second patient, a male, aged fifty years, gave a history of having fallen and sprained his left ankle five months earlier. Ever since he had had pain over the dorsum of the left foot and behind the lateral malleolus of the left ankle. This pain had been present without intermission and kept him awake at night. About a week after the accident he noticed numbness on the outer side of his left leg. Five weeks prior to the meeting he had sprained his right ankle, and ever since then he had noticed pain over the dorsum of the right foot and the lateral aspect of the right ankle, with numbness on the outer side of the right leg. Both ankles became swollen after a day's use. Cramps occurred in his feet at night. He had had no backache.

On examination, the patient presented the clinical picture of spondylolisthesis, and showed the signs of injury to both fifth lumbar nerves—namely, hyperactive knee jerks, normal ankle jerks, slight weakness of the dorsiflexors and evertors of the ankle, and hypaesthesia over the antero-lateral aspect of both legs. X-ray films revealed a moderate degree of spondylolisthesis of the fifth lumbar vertebra on the first sacral vertebra, and to a lesser extent the fifth lumbar vertebra had slipped forward in comparison with the fourth lumbar vertebra.

Dr. Woodland considered that the interference with both fifth lumbar nerves was more likely to be due to one or more disk herniations than to traction neuritis, and that the site of root pressure was probably not at the lumbo-sacral intervertebral disk. It was proposed to explore the intervertebral spaces between the fourth and fifth lumbar and first sacral vertebrae, remove any disk herniations and then perform a spinal fusion of the Hibbs type. It was thought that the patient had sprained his ankles because of weakness of the dorsiflexors and evertors of the ankles.

#### Herniated Nucleus Pulposus.

Dr. Woodland next showed a male patient, aged twenty-nine years, who said that in August, 1945, he had heard a click in his lumbar region when dragging a heavy load. He was unable to straighten his back because of bilateral lumbar pain. The pain completely left him after two weeks. In February, 1945, there had been a similar occurrence, but no click on this occasion. In June, 1945, after lifting a weight he had noticed bilateral lumbar pain, and ever since then he had been unable to flex his spine. In November, 1945, he had noticed a pain in the posterior aspect of his right thigh when sitting down driving a motor truck. Since December, 1945, he had been unable to work as a driver because of inability to use a foot brake, and since then he had had persistent pain in the posterior aspect of the right thigh, the right leg and the right ankle. On February 13, 1946, his spine was manipulated under general anaesthesia without relief. Complete relief was secured by the application of twenty pounds' traction on the right lower limb for two weeks; but the pain recurred when he commenced to walk.

On March 15 partial hemilaminectomy was performed. A large herniated nucleus pulposus was removed; in addition the intervertebral space was curetted, and a graft of bone chips was inserted between the bodies of the fifth lumbar and first sacral vertebrae. This operation completely relieved the pain. On March 29 a plaster jacket was applied, which was to be retained for three months.

Dr. Woodland considered that this patient presented typical signs of pressure on the first sacral nerve—namely, pain along the posterior aspect of the thigh and the postero-lateral aspect of the leg and ankle, with hypaesthesia



over the postero-lateral aspect of the leg and ankle, associated with absence of ankle jerks and slight weakness of the calf muscles. The object of the bone graft was to try to prevent collapse of the intervertebral space, and so prevent subsequent pain due to strain of the interarticular joints.

Dr. Woodland said that he presented the patient as illustrating the classical picture of herniated *nucleus pulposus* at the lumbo-sacral joint, and to demonstrate the routine of treatment adopted by him in these cases at present.

#### Fracture of the Neck of the Femur.

Dr. Woodland then showed two patients to illustrate methods adopted in the treatment of fractures of the neck of the femur when it appeared that the Smith-Petersen pin previously inserted might cut out. In the case of the older and more feeble patient—a female, aged seventy-two years—a fibula graft had been inserted parallel to the Smith-Petersen pin. X-ray examination four months after the insertion of the graft and five months after the insertion of the pin showed that the pin was still in place and that some union was occurring. In the case of the more active patient—a male, aged fifty-eight years—a McMurray type of osteotomy had been performed.

Dr. Woodland said that either of these procedures hastened union and frequently prevented the pin from cutting out of the femoral head completely. A McMurray osteotomy was the more certain procedure; but it involved the risk of fixation in a plaster hip spica for an average period of fourteen weeks, and was therefore to be avoided for feeble patients. The cause of the pins' commencing to cut out in both these cases was the unavoidable use of pins that were too short, as longer pins were not available. Dr. Woodland said that usually a pin inserted in an otherwise perfect position would cut out unless the subcortical bone of the centre of the head was reached.

Dr. Woodland then showed the X-ray films of a female patient, aged fifty-five years, who had sustained an adduction fracture of the neck of the femur eight months previously. Shortly after the injury a Smith-Petersen pin was inserted over a guide wire, which was shown to be in correct position in both antero-posterior and lateral X-ray films. It was found to be impossible to hammer the pin within one inch of the centre of the head of the femur. At the time this occurrence was puzzling. X-ray films taken a few weeks later revealed a piece of cortical bone lying at the extremity of the pin. Apparently a small piece of cortical bone derived from comminution of the fracture had been driven ahead of the pin, but finally could be driven no further. As was to be expected in the circumstances, in spite of the pin's not being driven fully in, the pin had held firmly and union was occurring.

#### Osteogenic Sarcoma of Tibia.

The next patient shown by Dr. Woodland was a boy, aged sixteen years, who gave a history that four months previously he had been struck over the front of his right tibia with a cricket ball. The next day the patient noticed a small lump about the size of a marble at the site of injury. This swelling gradually became larger and was painful if bumped. One month prior to the meeting, pain of a throbbing type occurred at night.

Examination revealed a large swelling over the proximal third of the anterior aspect of the right tibia. The skin over the swelling was adherent, dull red in colour and hot. X-ray examination revealed the typical picture of a periosteal type of osteogenic sarcoma. An intensive course of deep X-ray therapy was given without any clinical improvement. The X-ray appearances showed that the lesion had progressed. There was no evidence of metastases in the lungs. It had been intended to follow the course of deep X-ray therapy by amputation, but the boy's parents declined to permit operation.

Dr. Woodland considered that intensive deep X-ray therapy without any regard for skin burns, followed by amputation, was the best treatment for osteogenic sarcoma of limb bones.

#### Plantar Warts.

Dr. Woodland's last patient was a male, aged sixty years, who gave a history of plantar warts beneath the necks of the fifth metatarsals of both feet for six years. He had received conservative treatment, radium treatment and deep X-ray therapy without relief. On three occasions surgeons had excised the warts, but they had recurred. The patient had not worked for five years because of painful warts. When he was first examined about three months prior to the meeting, the warts resembled perforating ulcers.

Dr. Woodland said that the treatment adopted in this case illustrated the two most reliable methods of treating plantar

warts when the dermatologist had failed to cure the patient. In the case of one foot the wart was excised, instruments were changed and a Wolff's graft was applied. In the case of the other foot, after the wart had been excised a flap of skin was turned back from the little toe. The toe, together with the metatarsal head, was then amputated because of necrosis of the head of the metatarsal, probably due to irradiation therapy. In some cases a skin flap could be rotated from the dorsum of the foot; but in this case the advisability of amputation of the fifth toe provided a suitable flap of skin.

(To be continued.)

#### NOTICE.

THE General Secretary of the Federal Council of the British Medical Association in Australia has announced that the following medical practitioner has been released from full-time duty with His Majesty's Forces and has resumed civil practice as from the date mentioned:

Dr. C. H. Selby, 29, Rangers Road, Cremorne (October 28, 1946).

### Naval, Military and Air Force.

#### APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Number 215, of November 14, 1946.

#### AUSTRALIAN MILITARY FORCES.

##### Australian Army Medical Corps.

The army number of NX138194 Captain S. A. Horsman is as now shown and not as it appeared in Executive Minute No. 178 of 1946, promulgated in *Commonwealth Gazette* No. 182 of 1946.

The initials of SX1433 Lieutenant-Colonel D. W. Brummitt are as now shown and not as they appeared in Executive Minute No. 178 of 1946, promulgated in *Commonwealth Gazette* No. 182 of 1946.

The army number of S3256 Lieutenant-Colonel (Temporary Colonel) F. N. Le Messurier, D.S.O., is as now shown and not as it appeared in Executive Minute No. 156 of 1946, promulgated in *Commonwealth Gazette* No. 150 of 1946.

7th *Australian Field Ambulance*.—The name of NX100989 Captain B. R. Schloeffel is as now shown and not as it appeared in Executive Minute No. 188 of 1946, promulgated in *Commonwealth Gazette* No. 182 of 1946.

*Inter-Service Medical Wing Demobilization Centre (Australian Military Forces Component)*.—The name of SX34503 Captain J. W. Rollison is as now shown and not as it appeared in Executive Minute No. 178 of 1946, promulgated in *Commonwealth Gazette* No. 182 of 1946.

The notification respecting the transfer to the Reserve of Officers of NX166837 Captain G. R. Cockburn which appeared in Executive Minute No. 178 of 1946, promulgated in *Commonwealth Gazette* No. 182 of 1946, is withdrawn.

*To be Temporary Colonel, 28th September, 1946.*—VX14663 Major (Temporary Lieutenant-Colonel) C. W. Nye, E.D., is appointed to command 130th Australian General Hospital.

*No. 115 (Heidelberg) Military Hospital: To be Temporary Majors, 20th September, 1946.*—Captains VX95229 S. E. Williams and NX141960 J. McB. White.

N100925 Lieutenant-Colonel C. O. Donovan is placed upon the Regimental Supernumerary List, 13th September, 1946.

*To be Temporary Lieutenant-Colonel, 6th September, 1946.*—NX102551 (NP9910) Major J. R. Nimmo.

*To be Lieutenant-Colonel, 27th September, 1945.*—N100925 Major (Temporary Lieutenant-Colonel) C. O. Donovan.

*Inter-Service Medical Wing Demobilization Centres (Australian Military Forces Component).*—NX207659 Captain J. J. G. McGillr is placed upon the Regimental Supernumerary List, 21st August, 1946.

#### Reserve of Officers.

The undermentioned officers are transferred to the Reserve of Officers with effect from the dates indicated, and on the date prior to such transfer, where applicable, they cease to be seconded. Officers holding temporary rank relinquish such temporary rank on the date of transfer to the Reserve of Officers:

Captains (Temporary Majors) QX48804 C. N. Sinnamon, 6th September, 1946, and VX64241 E. E. Spring, 4th

September, 1946, and VX67668 Captain L. T. Griffiths, 16th July, 1946.

2nd/8th Australian General Hospital.—VX64356 Captain J. H. Currell, 10th September, 1946.

2nd/11th Australian General Hospital.—WX76400 Captain J. W. Best, 3rd September, 1946.

106th Australian General Hospital.—VX39250 Captain (Temporary Major) D. R. Gauld, 6th September, 1946.

No. 110 (Perth) Military Hospital.—WX40035 Captain C. W. J. Bourke, 12th September, 1946.

No. 112 (Brisbane) Military Hospital.—QX36225 Captain A. D. Isles, 30th August, 1946.

No. 113 (Concord) Military Hospital.—NX116632 Major L. T. Shea, 7th September, 1946, and Captains NX203642 J. Moloney, 6th September, 1946, and NX173537 J. Laing, 3rd September, 1946.

No. 115 (Heidelberg) Military Hospital.—WX1163 Major F. W. Connaughton, 6th September, 1946, and Captains VX69064 I. H. McConchie, 11th September, 1946, and VX117111 J. W. Wales, 13th September, 1946.

121st Australian General Hospital (Australian Imperial Force).—SX32619 Major J. M. M. Gunson, 5th September, 1946.

124th Australian Special Hospital.—VX133112 Major C. G. B. Colquhoun, 16th July, 1946.

107th Australian Convalescent Depot.—VX94813 Captain P. E. Dane, 16th July, 1946.

2nd/1st Australian Hospital Ship.—NX200814 Captain M. F. Windsor, 29th August, 1946.

2nd/4th Australian Field Ambulance.—WX34004 Major R. G. Linton, 16th July, 1946.

2nd/13th Australian Field Ambulance.—NX76356 Captain I. S. Booth, 3rd September, 1946.

2nd Australian Out-Patients' Depot.—TX6316 Captain J. G. Simpson, 16th July, 1946.

Inter-Service Medical Wing Demobilization Centres (Australian Military Forces Component).—Captains QX33119 W. Arrowsmith, 5th September, 1946, NX176295 R. M. Lane, 6th September, 1946, NX77286 H. J. Richards and NX116468 E. H. Ross, 3rd September, 1946, VX92423 R. J. Baldwin, 13th September, 1946, TX6484 P. Zerman, 27th August, 1946, VX81146 V. E. Hollyock, 4th September, 1946, VX65513 R. L. Sleeman, 7th September, 1946, and SX19023 E. D. Boer, 12th September, 1946.

The undermentioned officer is transferred to the Reserve of Officers with effect from the dates indicated, and on the date prior to such transfer, where applicable, ceases to be seconded. Officers holding temporary rank relinquish such temporary rank on the date of transfer to the Reserve of Officers and are granted from such date honorary rank on the Reserve of Officers equivalent to the temporary rank relinquished:

No. 115 (Heidelberg) Military Hospital.—VX138620 Captain (Temporary Major) A. E. Piper, 12th September, 1946.

#### Retired List.

The undermentioned officer is placed upon the Retired List on the date indicated with permission to retain his present substantive rank and wear the prescribed uniform:  
1st Australian Out-Patients' Depot.—N429481 Captain E. L. B. Hanrahan, 21st June, 1946.

#### Reserve Citizen Military Forces.

2nd Military District: To be Honorary Major, 9th January, 1946.—Captain M. R. Joseph.

3rd Military District.—The following officers are placed upon the Retired List with permission to retain their ranks and wear the prescribed uniform, 13th September, 1946: Lieutenants R. E. Mathews and C. M. A. Whiteman (née Hagenaar), Captain M. E. McDowall (née Hepburn), and Lieutenants D. O. J. Chomley and M. E. Smith (née MacRae).

4th Military District.—The following officers are placed upon the Retired List with permission to retain their ranks and wear the prescribed uniform, 22nd August, 1946: Lieutenants M. G. Hugh (née Matters), L. R. Morphet (née Anderson), W. D. McKenzie (née Nicholas), B. Nisbett (née Schollefeld), V. E. Jamaeson (née Ryan), M. H. J. Young (née Muirhead) and J. C. Nicholas (née Swan).

#### ROYAL AUSTRALIAN AIR FORCE.

##### Citizen Air Force: Medical Branch.

Flight Lieutenant D. Hemming-Jones (277460) is called up from the Reserve to the Active List for full-time duties with effect from 6th August, 1944.

The probationary appointment of Flight Lieutenant D. Hemming-Jones (277460) is confirmed with effect from 6th February, 1945.—(Ex. Min. No. 265—Approved 6th November, 1946.)

## Correspondence.

### AIDS TO DEFÆCATION.

SIR: In the correspondence columns of *The Lancet* letters have recently appeared (August 17, September 7) on the subject of "Aids to Defæcation".

When the rectum is loaded and defæcation difficult, one of the simplest aids to defæcation consists in pressing gently on the rectum with the fingers of the left hand between the left *tuber ischii* and the anus.

This manoeuvre expresses the lowest and most constipated mass of fæces and the remainder is then expelled by the induced action of the bowel.

As an additional "aid", the anal canal and anus should first be lubricated with "Vaseline" or surgical jelly.

Yours, etc.,

"CONSTIPATION".

Sydney.

November 8, 1946.

### A PLEA FOR SIMPLER MEDICAL WRITING.

SIR: The protean distribution of psychosomatic obfuscation among pubescent persons must occasion perturbation among rhinologists and tonsillectomists, who must be cognizant of the fact that hospitalization, with a view to prophylactic tonsillectomy and adenoidectomy, is indicated in order to prevent these essentially schizoid personalities from regression to manic depressive psychosis.

In fact, one might submit incontrovertible evidence that it would be beneficial if all children of both sexes were bilaterally tonsillectomized and appendectomized before becoming pubertized.

(Hysterectomists will probably suggest similar prophylactic operative measures for patients of the contralateral sex.)

The almost complete occlusion of the naso-pharynx by adenoidal hypertrophy in these obsessional hysterohypochondriacal maladjustees has irreversibly deoxygenated the hæmoglobin of the blood stream, and perpetuated that schizophrenic facies with its pseudo-cyanotic tinge which sometimes becomes almost sub-icteric.

It is indeed sad to think that had these unhappy patients been hospitalized (with bathroom privileges) and adenoidectomized in time, their penumbrous personalities might have been essentially normal, of good nutritional status and of good hæmic component; though still perhaps somewhat asthenic in habitus.

May I, in conclusion, tender my felicitations to Dr. S. F. McDonald, with whose incontrovertibly accurate thesis I find myself in complete agreement.

Yours, etc.,

"B.W.O."

November 18, 1946.

### SOME PROBLEMS OF BACKACHE AND SCIATICA.

SIR: Dr. Lindon has doubted the pain sensibility of the intervertebral disk (*THE MEDICAL JOURNAL OF AUSTRALIA*, September 7, 1946, page 345). He later admits (November 2) that nerve fibres are present in the disk, but states "that the disk itself is a structure sensitive to pain is not yet proven". For obvious reasons proof is difficult to obtain, and I understand that Dr. Young (September 21) referred, among others, to the observation of Josey and Murphey on the production of pain by pressing on the disk as that observation had obviously been made with extreme care. For example, these authors even took care to distinguish between pain caused by pressure on the disk and pain caused by traction on a nerve root which they had infiltrated with procaine. Many would have assumed that traction on such a nerve root was painless. Dr. Lindon has stated "there is no doubt about the pain sensibility of apophyseal joints". Can he refer me to observations on the existence of nerve fibres in the apophyseal joints and to careful observations on the production of pain by applying stimuli to these joints? If he cannot, then the pain sensibility of these joints is not "proven". I would agree that the apophyseal joints probably are sensitive to pain, but is there any real evidence to support this belief? Is there not better evidence that the disk is sensitive to pain?

Dr. Lindon writes: "The following is the probable life history of a degenerating disk: (1) repeated minor traumata

occur; (ii) the *annulus fibrosus* is weakened and the *nucleus pulposus* is loosened; (iii) either (a) a more severe injury then ruptures the annulus, and the nucleus is extruded . . . It would appear to me that there is no essential difference between stage (ii) as postulated by Dr. Lindon and the concealed disk as observed by Dandy and others. Has not Dr. Lindon postulated the very existence of the concealed disk? Then why has he subsequently described it as a "good example of wishful thinking"?

Dr. Lindon has also mentioned "abnormal mobility in the apophyseal joints". The disk and the apophyseal joints between two vertebrae form a unit and, except in defects of the pedicles and laminae, it is impossible to have movement occurring in the joints without at the same time having movement at the disk. If there is abnormal mobility in the apophyseal joints, surely the disk must share in this abnormal mobility. How does Dr. Lindon recognize abnormal mobility in the apophyseal joints? Surely he must use some sort of a mobility test. Then why has he described the disk mobility test as a "good example of wishful thinking"?

Yours, etc.,

MARION A. RADCLIFFE-TAYLOR.

Beverley,  
Western Australia,  
November 14, 1946.

#### SURGICAL TREATMENT OF DEAFNESS: THE FENESTRATION OPERATION FOR OTOSCLEROSIS.

SIR: The report and comments on the fenestration operation for otosclerosis by Dr. Douglas G. Carruthers which appeared in your journal of November 9, prompts me to support his opinions.

At the conference of the Royal Australasian College of Surgeons in Sydney in June of this year, otologists who had given time and study to this difficult problem had ample opportunity of observing the interest and knowledge which Dr. Carruthers showed in the surgical treatment of otosclerosis.

I entirely agree that it is not necessary to study in the clinic conducted by Dr. Julius Lempert in New York before one can perform this operation. What is necessary is a complete study of all the available literature, an extensive experience in the surgery of the temporal bone and very many hours of careful cadaver practice. The latter, as well as the operation in the living, is a tedious and exhausting procedure, which must be repeated many times before permanently successful results will be obtained.

Some of the most successful cerebral and thoracic surgeons in Australia, whose results compare very favourably with those of any overseas clinic, have developed their surgery in this manner. We have not the financial endowment, nor the organization, nor even the elaborate surgical equipment of some overseas clinics, but successful results are obtained despite these shortcomings.

The fenestration operation is now being performed in Melbourne by a small number of otological surgeons who have been interested in the subject for some time and who have spent very many hours in cadaver practice. Cases are too few, and too recent to publish as yet, but the results so far are extremely encouraging. The deaf have had hearing returned to them. One has only to experience the touching gratitude of these unfortunate people to be given a greater incentive to overcome the difficulties associated with this work.

Yours, etc.,

CECIL CANTOR, M.D., B.S. (Melb.),  
F.R.C.S. (Edin.), F.R.A.C.S. (L.O.),  
D.L.O. (Lond.).

55, Collins Street,  
Melbourne,  
November 14, 1946.

#### SEVERE LIVER DAMAGE IN INFECTIVE HEPATITIS.

SIR: Under the above heading in the journal of November 9, 1946, Dr. J. P. O'Brien suggests that "Atebrin" may have been the cause of hepatitis in the case I reported a few weeks earlier. This possibility was so seriously considered that on March 19, 1946, the suppressive "Atebrin" (0.1 gramme daily) which the patient had been taking since June, 1945, was discontinued and "Paludrine", 0.1 gramme twice weekly, was substituted. By this time jaundice had

almost disappeared, and despite the persistent fluid accumulations, it seemed that improvement had already begun. I agree that the time has come to speak more freely about "Atebrin" and its possible toxic effects and feel that a brief review of the literature is first necessary.

Liver damage in persons taking "Atebrin" was first reported in 1937.<sup>(1)</sup> During 1945 there was considerable work on liver function in human volunteers taking suppressive doses of "Atebrin",<sup>(2,3)</sup> and the results of animal experiments in which massive doses were used<sup>(4)</sup> were published. A paragraph from a Special Article<sup>(5)</sup> in *The Journal of the American Medical Association* of December 15, 1945 (that is, some months after war had ended), is worth quoting as the considered American opinion at that time.

In rare instances aplastic anemia, other severe dyscrasias (such as agranulocytosis) and severe acute hepatitis have occurred in association with the lichenoid-eczematoid syndrome and with exfoliative dermatitis. Similar cases have also been observed rarely in persons taking atabrine who do not develop skin disease. Attention is called to the fact that the fatality rate in these cases of aplastic anemia and of hepatitis has been almost 100 per cent. The relationship between this condition and the skin disease is not clear, but the association is striking. (As regards hepatic disease, in areas where infectious hepatitis is common the exclusion of this infection may be extremely difficult.)

Clarence M. Agness in May, 1946,<sup>(6)</sup> reported the occurrence, in a large series of Chinese patients taking "Atebrin" as prophylaxis or treatment of malaria, of five cases of exfoliative dermatitis coinciding with or preceding severe hepatitis. Of these, three died. In August, 1946, R. P. Custer<sup>(7)</sup> reported 57 cases of aplastic anemia which in 25 cases had been preceded by skin lesions. At autopsy liver lesions were found in ten cases. Five were indistinguishable from epidemic hepatitis as described by Lucké.<sup>(8)</sup> Three cases showed active periportal hepatitis, one focal intralobular hepatitis and one central phlebitis. Infective hepatitis was epidemic in the area at the time and the author regarded the liver lesions as of doubtful significance.

The following facts seem to be established:

1. Liver damage due to "Atebrin" does occur, but is extremely rare.
2. In all reported cases it is associated with extensive skin disease or aplastic anemia.
3. The reaction, when it does occur, is typically a severe acute liver failure with a high mortality.
4. Jaundice occurs late as a reflection of massive hepatocellular damage, and an obstructive phase is not prominent.

I think Dr. O'Brien will agree that on the above evidence it is difficult to incriminate "Atebrin" in the case I reported with its subacute onset, prolonged obstructive jaundice, absence of skin lesions or bone marrow aplasia, slow progressive course and eventual recovery. Though lacking the final proof of virus transmission experiments, infective hepatitis still seems the most likely diagnosis.

Yours, etc.,

DOUGLAS STUCKEY.

14, Railway Parade,  
Burwood,  
New South Wales,  
November 16, 1946.

#### References.

- (1) J. W. Field, J. C. Niven and E. P. Hodgkin: "Prevention of Malaria in the Field by the Use of Quinine and Atebrin (Experiments in Clinical Prophylaxis)", *Bulletin of the Health Organization of the League of Nations*, Volume VI, 1937, page 236.
- (2) W. R. M. Drew and J. Reid: "Prolonged Administration of Mepacrine", *The Lancet*, July 28, 1945, page 107.
- (3) J. B. Macgrath: "Prolonged Administration of Mepacrine: Effect on Tests of Organ Function", *Annals of Tropical Medicine and Parasitology*, Volume XXXIX, October, 1945, page 128.
- (4) O. G. Fitzhugh, A. A. Nelson and H. O. Carvery: "Chronic Toxicity of Quinacrine (Atabrine)", *Journal of Pharmacology and Experimental Therapeutics*, Volume LXXXV, November, 1945, page 207.
- (5) Special Article: "Untoward Reactions Attributable to Atabrine", *The Journal of the American Medical Association*, Volume CXXXIX, December 15, 1945, page 1091.
- (6) Clarence M. Agness: "Atabrine as a Cause of Fatal Exfoliative Dermatitis and Hepatitis", *The Journal of the American Medical Association*, Volume CXXXI, May 4, 1946, page 14.
- (7) R. P. Custer: "Aplastic Anemia in Soldiers Treated with Atabrine (Quinacrine)", *The American Journal of the Medical Sciences*, Volume CCXII, August, 1946, page 211.
- (8) B. Lucké: "Pathology of Fatal Epidemic Hepatitis", *The American Journal of Pathology*, Volume XX, May, 1944, page 595.



## Australian Medical Board Proceedings.

### TASMANIA.

THE undermentioned have been registered, pursuant to the provisions of the *Medical Act, 1918*, of Tasmania, as duly qualified medical practitioners:

Miller, Archibald McLaren, M.B., B.S., 1936 (Univ. Melbourne), Hobart.  
Lampard, Dudley John, M.B., B.S., 1941 (Univ. Adelaide), Hobart.  
Starr, Frank John Mitchell, M.B., 1944 (Univ. Sydney), Wynyard, Tasmania.

The following additional qualification has been registered: Gatenby, H. B., M.S., 1941 (Univ. Sydney).

## Nominations and Elections.

THE undermentioned have applied for election as members of the South Australian Branch of the British Medical Association:

Cheeseman, Graham Frank, M.B., B.S., 1946 (Univ. Adelaide), Springbank Road, Clapham.  
Fowler, Malcolm Charles, M.B., B.S., 1946 (Univ. Adelaide), 1, Barker Road, Prospect.  
Moore, Max Clifford, M.B., B.S., 1946 (Univ. Adelaide), 1, Bagot Avenue, Mile End.  
McCann, William James, M.B., B.S., 1946 (Univ. Adelaide), Royal Adelaide Hospital, Adelaide.  
Stratton, Keith Jeffrey, M.B., B.S., 1944 (Univ. Adelaide), Box 30, Booleroo Centre.

## Obituary.

### ROBERT GEORGE MCPHEE.

WE regret to announce the death of Dr. Robert George McPhee, which occurred on November 18, 1946, at Geelong, Victoria.

## Books Received.

"The Thomas Baker, Alice Baker and Eleanor Shaw Medical Research Institute: Collected Papers", Volume IV. 9½" x 7½".  
"The Physiology of Tissues and Organs: An Introduction to the Study of Systematic Physiology", by Douglas H. K. Lee, M.D., M.Sc., D.T.M., F.R.A.C.P.; 1946. Brisbane: The University of Queensland. 8½" x 5½", pp. 168, with illustrations.

## Medical Appointments.

Dr. T. W. George, Dr. K. St. V. Welch, Dr. H. S. Roberts, Dr. E. Fabian, Dr. O. Kudelka, Dr. F. Piscitelli, Dr. J. A. Waddy, Dr. B. G. Green, Dr. E. W. Knight, Dr. R. H. M. Connell, Dr. C. C. Marshall, Dr. T. J. Ick, Dr. L. W. Bryant and Dr. R. W. L. Crosby have been appointed school medical officers under and for the purposes of the *Education Act, 1932*, of Tasmania.

Dr. W. Hillyer has been appointed government medical officer at Manildra, New South Wales.

Dr. K. G. McK. Aberdeen, of Perth, has been appointed a Justice of the Peace for the State of Western Australia in lieu of the Avon Magisterial District, Western Australia.

Dr. E. R. Hearn has been appointed joint medical officer of health with Dr. I. O. Thorburn, of the Canning Road Board, Western Australia.

Dr. A. Breckler has been appointed medical officer of health of the Mundaring Road Board, Western Australia.

Dr. George Ellis and Dr. L. A. Atkins have been appointed members of the medical board constituted by *The Workers' Compensation (Lead Poisoning, Mount Isa) Acts, 1933 to 1945*, of Queensland.

Dr. R. A. Green has been appointed deputy quarantine officer, Port Kembla, New South Wales, under the *Quarantine Act, 1908-1924*.

## Diary for the Month.

- DEC. 3.—New South Wales Branch, B.M.A.: Organization and Science Committee.
- DEC. 4.—Victorian Branch, B.M.A.: Branch Meeting.
- DEC. 4.—Victorian Branch, B.M.A.: Council Meeting.
- DEC. 4.—Western Australian Branch, B.M.A.: Council Meeting.
- DEC. 5.—New South Wales Branch, B.M.A.: Special Groups Committee.
- DEC. 9.—Victorian Branch, B.M.A.: Executive Committee.
- DEC. 10.—Tasmanian Branch, B.M.A.: Ordinary Meeting.
- DEC. 10.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
- DEC. 11.—Victorian Branch, B.M.A.: Council Meeting.
- DEC. 12.—New South Wales Branch, B.M.A.: Branch Meeting.
- DEC. 12.—South Australian Branch, B.M.A.: Council Meeting.
- DEC. 12.—Queensland Branch, B.M.A.: Annual Meeting.
- DEC. 17.—New South Wales Branch, B.M.A.: Medical Politics Committee.
- DEC. 17.—New South Wales Branch, B.M.A.: Ethics Committee.
- DEC. 20.—Queensland Branch, B.M.A.: Council Meeting.

## Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

**New South Wales Branch** (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phoenix Mutual Provident Society.

**Victorian Branch** (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

**Queensland Branch** (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

**South Australian Branch** (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

**Western Australian Branch** (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

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